TENDER DOCUMENT

(PROCUREMENT-OF-LABORATORY- SCIENTIFIC EQUIPMENT/ SOFTWARES/ EXPENDABLES FOR CAS-EN Labs.)

Centre for Advanced Studies in Energy - NUST Islamabad,Pakistan

1. Bids are invited from well-established suppliers/OEM/ Distributor, having NTN& Sales Tax registration with modern facilities for supply of "Scientific Equipment/Software's/Expendables for Centre for Advanced Studies in Energy - NUST Islamabad" Complete specifications and required quantity have been mentioned and attached as per **(Annex-A to Annex- J**). bearing following LOT/LAB Specifications:

   a. Annex F Smart Grids and Electrical power systems lab (LOT1)

   b. Annex G Thermal Energy Engineering Lab (LOT 2)

   c. Annex H Advanced Energy Materials and Characterization Lab (LOT 3)

   d. Annex I Solar Energy Research Lab (LOT **4)**

   e. Annex J Machine Shop (LOT 5)

2. **Submission of Quotation Bids be submitted as under in three (3) sealed envelopes:**
   a. 1st envelop, with sealed technical offer, marked as "Technical Bid"
   b. 2nd envelop, with sealed financial offer & Earnest Money, marked as "Financial Bid"
   c. Both envelops to be placed in a 3rd envelop, sealed and mention firms' address, phone etc should be addressed to Operations & Supply Chain Specialist, CAS-EN, SMME West Wing Block, NUST H-12 Islamabad.
   d. Bidder may quote for maximum upto Three Lots (labs) only with max number of quotations for each lot.

3. **Quotation & Attachments to be provided by the companies:**
   a. Sealed bid should be submitted along with the quotation, detailed specifications, etc.
   b. Quotation should include all applicable taxes i.e. Income Tax, GST, etc.
   c. Submit "**Undertaking by Company**" on the form attached as **Annex-A**.
   d. Attach earnest money (refundable) equal to 3% of total quoted value with the bid as pay order/draft in favor of *CAS-EN NUST.*
   e. **Please Submit**:
      i. Income and Sales tax certificates along with record of GST deposited in last one year..
      ii Company profile.
      iii. Bank statement of last 1 Year
      iii. Where subject services provided in last 5 years.
      iv. Quality Certification (if any).
      v. OEM Authority letter
   f. Bidders are asked to quote validity period of quotation on authority letter of OEM.

However, at least 90 days validity after the opening date of Tender is required.
Note: -Quotation is liable to be rejected in case of incomplete bid as stated above.

4. **Instructions for Suppliers to Avoid Rejection. Note Carefully:**

a. Tender Document may either be downloaded from the web www.casen.nust.edu.pk or be obtained from undersigned office during working hours (1100 -1300hours) till 7 September 2015.

b. The financial bid be clearly quoted on CIF basis (USD/Eur/JPY). However, the locally available equipment are to be quoted on FOB/FOR basis, as applicable.

c. Please indicate following in your quotations separately:
   i. Insurance charges
   ii. Taxes i.e., custom duty, excise duty, income tax, GST etc., if applicable

d. Bid shall be rejected if the rate(s) are not clear, incomplete, conditional or ambiguous.

e. Insurance and LC charges (where applicable) will be borne by vendor/supplier. Moreover, custom clearance and all related formalities will also remain sole obligation of the vendor.

f. The fitting/installation charges (if any) to be included in the bid price

g. Performance Guarantee(PG): Selected firm shall provide a 5% value of contracted value as performance guarantee (PG) till warranty period.

h. Right to purchase at risk-and-cost of Supplier**,** if the selected supplier:
   i. Fails to complete the order, or
   ii. Delays to supply within the delivery time mentioned in the quotation or extended time given by the Purchaser, or

j. Then NUST reserves the right to:

Make purchase at the risk-and-cost of Supplier for the un-supplied/full quantity

As the case may be forfeits complete/ portion of Earnest Money.

k.. NUST **reserves the right to:**
   i. Change the required quantity i.e., increases or decrease while placing Purchase order.
   ii. Reject any bid or procurement process, any time, as per rules of PPRA.

l. Reps of bidders are allowed to witness the opening of tenders, without conferring any privilege.

m. **Contract Agreement** shall be assigned to the successful bidder(s).

n. **Late** submission of tender will not be entertained under any circumstances.

o. Information about purchase will **not be communicated to un-authorized person**(s).

p. In case of dispute, **decision of** Principal-CAS-EN/Rector-NUST shall be final and binding on both the parties.

q. Bids shall be compared by **„Item wise"** for maximum number of permissible lots/labs

r. **Responsibility fo**r:-
   i. Transportation of sample or the bulk up to / within NUST premises and

ii. loading/ un-loading, labor,
iii. Installation, etc .will be carried out by the engineers of supplier.

s. Subletting of the bid disqualify the successful vendor.
t. Bid submitted through email/fax will automatically stand disqualified.
u. Integrity Pact envisaged in PPRA rules will apply.
v. All stake holders will be responsible to maintain secrecy/ confidentiality of information /Data shared during all stages of Bidding/ Contract.
w. Bids can be withdrawn with in three working days of its submission.
x. Vendor will also be responsible to provide end user certificate, if required

5. **PENALTY/Late Delivery**

In the event of delay in delivery at supplier fault, the supplier shall inform the purchaser before expiry of such period giving reasons or justification for delay. However, purchaser reserves the right to take following actions:-

a. Evaluate the request for extension in delivery period as per its merit and may consider extension in delivery period or otherwise.
b. May cancel the contract.
c. Can purchase from elsewhere stores not delivered at the risk and expense of supplier and without notice to him or
d. To recover liquidated damages when the purchaser Is satisfied that failure to supply the stores within the scheduled delivery period has been for reason within the control of supplier, and /NUST has suffered loss for reasons of belated delivery. These liquidated damages if imposed will be recovered at the rate of up to 2% but not less than 1% of the value of the stores supplied late per month or part of a month for the period exceeding the original delivery period, subject to the provision that total liquidated damages thus proposed will not exceed 10% of the total value of the stores delivered late.
e. The purchaser's decision under this clause shall not be subjected to arbitration.

6. **INSPECTION/TESTING**: NUST Purchase Committee, Acad Dte will inspect the items as per specifications. After arrival at premises, faculty will carry out necessary testing of equipment and render a certificate of correctness.

7 **TERMS OF PAYMENT:** Bidders are asked to quote terms of payment; however, NUST reserves the rights to finalize the payment schedule as per the payment rules on the subject.

Sealed envelope should be addressed to "Procurement Office CAS-EN„ and reach the undermentioned address until 8 September 2015 at 11:00 a.m. Technical quotations will be opened in the presence of firms reps and members of CAS-EN equipment purchase committee on same day at 11:30a.m at the above mentioned address. Financial bids of shortlisted firms shall be opened on 15 September 2015 at 11:30 am at above mentioned address.

Tender notice is only an invitation to offer Bid to the CAS-EN NUST and the competent authority/procurement office may reject all bids or cancel the tender as per rules laid down by PPRA.

8. SOURCE AND NATIONALITY REQUIREMENTS:

All goods and services offered in response to this advertisement are to be supplied and under any resulting award must meet USAID Geographic Code 937 in accordance with the United States Code of Federal Regulations (CFR), 22 CFR §228. The cooperating country for this procurement is Pakistan.

Offerers may not offer or supply any commodities or services that are manufactured or assembled in, shipped from, transported through, or otherwise involving any of the following countries: Burma (Myanmar), Cuba, Iran, North Korea, (North) Sudan, Syria.

9. WARRANTY:

Standard warranty service and repair within the cooperating country is required for all commodities under this procurement. The warranty coverage must be valid on all commodities for a minimum of twelve (12) months after delivery and acceptance of the commodities, unless otherwise specified in the technical specifications.

10. TAXES:: CAS-EN being an educational institution is exempted from payment of taxes such as GST and import relevant duties such as Customs. CAS-EN is funded by USAID under Pakistan Enhanced Partnership Agreement (PEPA) between the United States of America and Islamic Republic of Pakistan. NUST will provide the appropriate exemption documentations to the successful bidders.

11. **ORDERED QUANTITY:**

This organization shall have the right to decrease or increase the quantity of units required at the time of issuance of purchase order/contract after due consideration of bid prices, delivery time, warranty and payment terms. The decision of the review and selection committee of NUST shall be considered as final and the organization has the right to accept or to reject any or all bids and cancel entire bidding process without assigning any reasons thereof.

12. **PACKING & TRANSPORTATION:**

All Equipment shall be individually packed in standard packing provided by the manufacturer for onwards transportation and delivery. Any item damaged during transportation will be replaced by the bidders at their own cost.

DELIVERY/SUPPLY SCHEDULE:

Supply and delivery lead time must be mentioned on quotation of all items is required from the date of notification of award to the successful bidder/bidder. The selected bidder will be responsible for packing of required quantities and timely delivery.

14. **DEFAULT.**

If the contractor fails to effect or keep in force any of the insurances referred to in the contract or fails to provide satisfactory work, NUST may, without prejudice to any other right or remedy, terminate the Purchase Order and cancel contractor rights or remedy to recover the amount paid in advance (if any). If the vendor fails to deliver items/services as per approved samples and specifications, NUST reserve the right to terminate the contract.

15. **TECHNICAL / USER MANUAL /PUBLICATION:**

Successful vendor(s) will be bound to provide subject material to CAS-EN at the time of delivery

16. **ARBITRATION:**

CAS-EN NUST procurement committee headed by Rector NUST will be the final authority for arbitration.

17. **LAW OF LAND:** law of the land will prevail over the entire process.

18. Force Majeure: Any delay, disruption/default due to ACT of God will not lead to any penalty

Operations and Supply Chain Specialist
SMME west wing Block
Center for Advanced Studies in Energy
NUST H-12 Islamabad, Pakistan
Email: procurement@casen.nust.edu.pk
Phone: 051-9085-5101 Cell:03005570212

ANNEX-A

Cover Letter / Proposal Submission undertaking.

Operations and Supply chain specialist Date:
XYZ
Center for Advanced Studies at NUST (CAS-EN),
SMME, west wing, NUST Campus H-12,
Islamabad

Dear Sir

We, the undersigned, offer to provide our services For "Supply of Lab. Equipment" in accordance with your Tender Document dated _____, and our Proposal. We are hereby submitting our Proposal, which includes this technical proposal, and a financial proposal sealed under separate envelopes.

We hereby acknowledge and agree to all terms, conditions, special provisions, and instructions included in the above-referenced RFP. We further certify that the below-named firm—as well as the firm's principal officers and all commodities and services offered in response to this RFP—are eligible to participate in this procurement under the terms of this solicitation and under USAID regulations.

The understand and agree that the decision of the procurement/evaluating committee shall be final and cannot be challenged on any ground at any forum and the procurement/evaluating committee will not be liable for any loss or damage to any party acting in reliance thereon.

Furthermore, we hereby certify that, to the best of our knowledge and belief:

- We have no close, familial, or financial relationships with any NUST / (CAS-EN) staff members;
- We have no close, familial, or financial relationships with any other offerors submitting proposals in response to the above-referenced RFP; and
- The prices in our offer have been arrived independently, without any consultation, communication, or agreement with any other offeror or competitor for the purpose of restricting competition.
- All information in our proposal and all supporting documentation is authentic and accurate.
- We understand and agree to NUST / (CAS-EN)' prohibitions against fraud, bribery, and kickbacks.

We hereby certify that the enclosed representations, certifications, and other statements are accurate, current, and complete

Authorized Signature

M/S_____

ANNEX-B

SOURCE AND NATIONALITY COMPLIANCE FORM

(Attachment of this form with Technical Proposal is must)

The purpose of this form is to gather information from bidders about source/nationality compliance. The authorized USAID geographic code for the USAID CAS-EN is 937.

1. **Origin**: While the concept of "origin" has been deleted from the USAID procurement regulations, there are still significant U.S. regulations (such as OFAC regulations) that prohibit transactions with certain countries. As such, I confirm that the quoted items are not manufactured, grown, produced, shipped from, or otherwise originate from any of the following countries: *Burma (Myanmar), Cuba, Iran, North Korea, (North) Sudan, or Syria*.

   ☐ No, I cannot confirm ☐ Yes, I confirm this is true.

2. **Source**:

   "Available for Sale" in the Cooperating Country:

   - Supplier is an authorized sales representative/dealer of the manufacturer in the cooperating country. If yes please provide brief introduction and attach copies of dealership certifications.
   - Quoted items are included in supplier's standard catalog. (Yes /NO)
     If yes, attach catalog.
   - Supplier certifies that quoted items are routinely traded or offered for sale in the cooperating country. (YES /NO)
   - Supplier has an installation base in the cooperating country. (YES / NO)
     If yes provide some details of after sale support points with complete addresses.
   - Offered equipment is serviceable by the supplier and has a valid warranty in the cooperating country (YES / NO)
     IF yes, please provide details of capability how equipment is serviceable in cooperating country
   - Complete details of type of warranty offered in cooperating country (or attach standard warranty terms and conditions offered).
   - Supplier will be responsible of ensuring that after sale service support / spare parts are available will try all efforts to make it available. (Bidder / Supplier agrees with is statement) – Yes / NO

   For items purchased outside of the cooperating country:

   If the items are <u>not</u> "available for purchase" in the cooperating country, identify the "source" of the equipment and describe compliance with the authorized geographic code 937**:**

The items will be imported from source is

[Describe the "source" countries and compliance with the authorized geo code.]

3. **Nationality**:

Per 22 CFR 228.12, organizations must meet **both** (a) **and** (b) below, as well as **either** (c) **or** (d):

a. The supplier is incorporated or legally organized under the laws of a country in the authorized geographic code:

[Describe the supplier's registration status; attach a copy of their business license or official registration to support registration status.]

b. The supplier is operating as an "ongoing concern" in a country in the authorized geographic code:

c. The supplier is managed by a governing body, the majority of whom are citizens (or lawful permanent residents) of countries in the authorized geographic code:

[Provide details and/or attach a certification from the supplier documenting that they comply with this.]

d. The supplier employs citizens (or lawful permanent residents) of countries in the authorized geographic code, in more than 50% of its permanent full-time positions and more than 50% of its principal management positions:

[Provide details, such as organizational chart with information, and/or attach a certification from the supplier documenting that they comply with this.]

ANNEX-C

Overall Compliance Undertaking
(To be attached with Technical Proposal)

I, (Name); (CNIC#); (Designation), (Company Name) have gone through the Terms/Conditions of this RFP and have found the document in whole as non-biased to any particular vendor or product/brand. All quoted items meet USAID Geographic Code 937. I hereby undertake and firmly bound myself to abide by/comply all sections of this tender document except for those items noted below.

1……
2……
3……
4……
5……
6……
7……
8……
9……
10……

Signature
Official Stamp
Date:

ANNEX-D

INFORMATION ABOUT RELEVANT PROJECTS COMPLETED / ONGOING FOR LAST 2 YEARS:

Attach document evidence.

Sr.#	Purchase Order / Contract Details	Contract Awarded Year	Client Name & Contact Details	Contract Amount	Contract Duration	Remarks
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

ANNEX-E

Evaluation Criteria

Sr.N0	Attribute	Max. marks	Marks Allotted
1	Authorized dealership	5	
2	Specs Conformity	25	
3	Manufacturer	5	
4	Past experience	6	
5	Back up support	10	
6	Warranty	7	
7	Local Outlets/Focal Person	5	
8	Technical strength of supplier	7	
9	Financial	30	

Note : Technical bid = 70%
Financial bid= 30%

SMART GRIDS AND ELECTRICAL POWER SYSTEMS LAB

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
	HIL & PHIL Systems for Power Grid				
	General Specifications				
1A	**Power Grid Simulator (upto 150 3-Φ bus at 50 µs, 180 I/O ch)**				
1	The minimum number of fast IO : 15 A/D (+- 10V, differential, 16 bits) , 45 D/A (+- 10V, 10 mA, 1 us rise time, 16 bits), 60 DI (opto-isolated, 5 to 30V), 60 DO (push-pull, 5 to 30V)				
2	The simulator must use commercially available INTEL compatible shared-memory computer and FPGA boards available by at least two suppliers to ensure easy and long-term support in PAKISTAN				
3	The simulator software must be able to get integrated with MATLAB-SIMULINK / PSCAD or equivalent softwares that enable the simulation of large SimPowerSystem models				
4	The simulator must also be capable to simulate power system with the classical nodal solver				
5	Users must be able to implement their own power systems/Renwable energy systems/power electronic models in FPGA chips with a time step less than one microseconds and using a graphical schematic editor without programing VHDL.				
6	Users must be able to develop and execute power system model in off-line mode (No I/O) on standard laptop and workstation using the same software as the real-time simulator. Off-line simulation must take advantage of available processor cores i.e. the size of the systems that can be simulated at 50 microsecond must increase as the number of processor cores increases or the time step value can decrease if more processor cores are used.				
7	Users must be able to simulate large micro-grid and distribution systems having very transmission lines with length shorter than 5 km using pi-section models. The simulator must be able to simulate at least 600 RLC branches accurately with a time step of 100 microseconds without adding any artificial delays.				
8	The processor allocation process must be fully automated				

1	9	users must be able to modify any model parameter values (R, L, C, machine parameters, transformers, loads …) on-the-fly while the simulation is running and without stopping the simulator.				
	10	User must be able to simulate multi-modular DC converter (MMC) for renewable energy integration and system interconnection. The simulator must be capable to simulate at least two DC-AC converters with at least 4800 MMC half-bridge cell in total.				
	11	the simulator must be able to interface directly with PSCAD or EMTP-RV to enable users to simulate the same model in real-time if the model does not exceed the simulation capability of the real-time simulator				
	1B	**Three-phase upto 15-KW (Total 3-ph high-frequency) 4-Q linear amplifier and sensors for PHIL applications**				
	1	The amplifier must be capable to generate and absorb active and reactive power. The capability to absorb active power must be at least 85% of the rated power.				
	2	The -3dB frequency bandwidth must be at least 5 kHz at 5% of the rated power				
	3	The supplier must demonstrate the capability to implement PHIL for micro-grid, power electronic, motor drive, PV, storage energy systems and other power electronic systems				
	1C	**Upto 10,000-bus real-time phasor-mode simulator software for large transmission, distribution and micro-grid systems**				
	1	This real-time software module must be compatible with Simulator 1A and power amplifier 1B to enable the real-time simulation of very large transmission and distribution and micro-grids in phasor mode with a time step of 10 milliseconds				
	2	The real-time phasor simulation module must be capable to simulate a grid with at least 10,000 nodes with a time step of 10 milliseconds in real-time even during faults, breaker switching and transformer tap changer operation.				
	3	The capability of 10,000 nodes, means 10,000 busses using positive sequence only or 10,000 individual electrical nodes to simulate unbalanced distribution systems				
	4	The real-time phasor simulation module must be capable to simulate a 10,000 node power grid with at least 3000 generator models with AVR, exciter, , Speed regulator and PSS as well as 3000 non-linear static and dynamic loads				
	5	The real-time phasor simulation module must be capable to read data from PSS/e dynamic transient stability software.				
	Maker:US,Europe,Japan or equivalent					
	A	All relevant accessories included				
	B	Hardware Warranty for 5 years from Installation				
	C	Installation/Commissioning/Training at NUST Pakistan				

	D	Shipping & Insurance Costs				
	E	Equipment with similar or better specs will be considered				
	F	Bidders are also required to name the existing satisfied users in Pak for their manufacturer				
2	***FPGA Based Rapid control prototyping(RCP) for power systems***					
	2A	RCP [Protection system and PMU development]				
	2B	RCP [Micro-grid controller development]				
	2C	RCP [Wide area Special Control and Protection System development]				
	General Specifications					
	1	RCP must be standard computer compatible with INTEL or equivalent processors and XILINX FPGA chips				
	2	RCP must be fully compatible with MATLAB, Simulink,PSCAD,EMTP-RV or equivalent softwares				
	Maker:US,Canada,Europe,Japan or quivalent					
	A	All relevant accessories included				
	B	Hardware Warranty for 5 years from Installation				
	C	Installation/Commissioning/Training at NUST Pakistan				
	D	Shipping & Insurance Costs				
	E	Equipment with similar or better specs will be considered				
	F	Bidders are also required to name the existing satisfied users in Pak for their manufacturer				
3	***Protection Relay Development System***					
	General Specifications					
	1	Protection Relays for Generation, Transmission and Distribution compatible with existing Phil setup				
	2	Customizable electromechanical and microprocessor relays that can be integrated with existing HIL Test Bed and can be programmable for various protection logics				
	3	Computer aided protection engineering software capable of performing complex and versatile simulations involving recloses,circuit breakers,fuses,relays coordination and rich database of all protective devices to perform fault studies				

3	**Maker:US,Europe,Japan or equivalent**					
	A	All relevant accessories included				
	B	Hardware Warranty				
	C	Installation/Commissioning/Training at NUST Pakistan				
	D	Shipping & Insurance Costs				
	E	Equipment with similar or better specs will be considered				
	F	Bidders are also required to name the existing satisfied users in Pak for their manufacturer				
4	***04 X Phasor Measurement Unit (PMU) Development System***					
	General Specifications					
	1	Must have GPS time synchronization upto ±100 ns				
	2	Input modules should be for 400 V (rms), 50 A (rms) signals with 50 kS/s per channel acquisition rate				
	3	4 GB of local, nonvolatile storage				
	4	All V and I inputs must be synchronized				
	Maker:US,Europe,Japan or equivalent					
	A	All relevant accessories included				
	B	Hardware Warranty				
	C	Installation/Commissioning/Training at NUST Pakistan				
	D	Shipping & Insurance Costs				
	02 X Phasor Data Concentrators (PDC) / Synchrophasor Development System					
	General Specifications					
	1	PDC must be modular and must be capable of collecting, processing, recording and archiving C37.118 compliant synchrophasor data.				

5	2	The PDC should have support for up to forty PMU or PDC inputs and up to eight user configurable channels for transmission of synchrophasor data to clients such as other PDCs, Super PDCs and/or EnerVista Synchrophasor Viewer.				
	3	PMU's must have RS485/RS422 Serial Interface Module				
	4	Power Supply must have ratings of 1-Phase,115/230 VAC input;24 to 28 VDC,5 A output)				
	5	GPS Module must have pulse per second (PPS) accuracry of ±100 ns or equiv				
	Maker:US,Europe,Japan or equivalent					
	A	All relevant accessories included				
	B	Hardware Warranty				
	C	Installation/Commissioning/Training at NUST Pakistan				
	D	Shipping & Insurance Costs				
6	***Power Measurement Systems***					
	General Specifications					
	6A	04 X Smart Meters with following specs:				
	1	Must have Built in Advanced GSM/GPRS Engine for Secure and Fast Data Communication				
	2	These meters should have the ability to be used as standalone product or to be integrated with various data collection and energy management tools				
	3	Must be capable of measuring Active and Reactive Energy and Power				
	4	Must be IEC 62053-21 & 23 compliant				
	5	Must have the capability of Load Profile Data Recording with Programmable Time Interval				
	6B	02 X digital high resolution storage oscilloscopes capable of making 04 channel floating measurements including three phase measurements.It must have 04 analog channels of bandwidth 100 Mhz or better and sampling rate 1 GS/s				
	6C	03 X Current probes capable of gauging current in the range 100 milli amperes to 1000 ampers and bandwidth 5 Hz - 50 kHz				
	6D	03 X High voltage differenntial probes with attenuation 100 X / 1000 X and bandwidth 50 Mhz.Input impedance must be differential 40 mega ohms or greater				
	6E	03 X High voltage probe single ended with peak voltage rating of 4 Kv and input capacitance < 3 Pf.				

	6F	05 X broad purpose Digital multimeters (DMM) capable of measuring AC/DC parameters				
	6G	RF Power meter for measuring RMS and Peak power having bandwith 10 Mhz - 8 Ghz				
	Maker:US,Europe,Japan or equivalent					
	A	All relevant accessories included				
	B	Hardware Warranty				
	C	Installation/Commissioning/Training at NUST Pakistan				
	D	Shipping & Insurance Costs				
	E	Equipment with similar or better specs will be considered				
	F	Bidders are also required to name the existing satisfied users in Pak for their manufacturer				
7	***Transient and Frequency Measurement Setup***					
	General Specifications					
	1	The setup must have > 8 simultaneously sampled 14-bit channels				
	2	It must have Upto 100 MHz analog bandwidth, 250 MS/s sample rate				
	3	High voltage probes should be of ratings up to 4KV				
	4	The setup must be user-programmable				
	5	There should be provision of streaming and Logging				
	Maker:US,Europe,Japan or equivalent					
	A	All relevant accessories included				
	B	Hardware Warranty for 5 years from Installation				
	C	Installation/Commissioning/Training at NUST Pakistan				
	D	Shipping & Insurance Costs				
8	***Power Quality Analyzer***					
	General Specifications					
	1	It must have basic accuracy (V and I readings) of 0.05 % reading + 0.05 % range				
	2	Must have 3-phase voltage inputs (400 Vrms) with peak voltage rating of 600 Vrms and current rating of 20 A				
	3	Monitor power according to international standards such as IEC 61000-X and EN 50160 or equivalent				
	Maker:US,Europe,Japan or equivalent					
	A	All relevant accessories included				

	B	Hardware Warranty for 5 years from Installation				
	C	Installation/Commissioning/Training at NUST Pakistan				
	D	Shipping & Insurance Costs				
9	***Programmable Electronic Load and DC power Supplies***					
	General Specifications					
	9A	02 X Programmable resistive, capacitive and inductive loads up to 25 KW				
	9B	02 X High voltage programmbale DC power supplies having output voltage in the range 50 V - 5000 V and output current in the range 0 - 5 mA				
	9C	02 X Programmable DC battery simulating power supplies having output voltage in the range 0-15 V and output current 0-5 A				
	Maker:US,Europe,Japan or equivalent					
	A	All relevant accessories included				
	B	Hardware Warranty for 5 years from Installation				
	C	Installation/Commissioning/Training at NUST Pakistan				
	D	Shipping & Insurance Costs				
10	***Smart GRID Automation along with SCADA and DCS System***					
	General Specifications					
	1	It should comprise of Real Time FPGA based Smart Grid Analyzer,Pole Top Sensing , 3 CT, 3 PT along with GPS module and GPS antenna.				
	2	The equipment must support smart grid networking protocols like DNP3, IEC 60870-5 and IEC 61850, onboard COMTRADE (IEEE 37.111) data logging and standard three-phase IEC, EN, and IEEE power quality analysis				
	3	There must be six high voltage /current channels along with HVDC Digital input module				
	4	The package must be provided with a simulation software that allows all distributed nodes to be controlled and managed via a single control room. It should also have the provision to manage different type of I/O via web				
	5	The system must also be equiped with industrial touch panel computer and high speed raid for data storage				
	6	Must support Communication over serial (IEC 60870-5-101) and Ethernet (IEC 60870-5-104				
	7	It should support GOOSE and must be Open PDC compatible				
	Maker:US,Europe,Japan or equivalent					
	A	All relevant accessories included				
	B	Hardware Warranty for 5 years from Installation				

	C	Installation/Commissioning/Training at NUST Pakistan				
	D	Shipping and Insurance Cost				
	E	Equipment with similar or better specs will be considered				
	F	Bidders are also required to name the existing satisfied users in Pak for their manufacturer				
11	***PSCAD Software for Power System simulation studies***					
	General Specifications					
	1	License Type: PSCAD X4 Educational MUL Multi User Network License (10-users)				
	2	The software should be delivered in the running condition for the given licences on the provided machines				
	3	Software should include all the available libraries including Add ons.				
	4	Software Maintenance Support: maintenance and technical Support should be provided. Free updates will be provided if any. Technical Support should be offered through telephone, e-mail, and Web assistance provided by				
	5	Training and Technical Support should be included in the software package				
12	***Electro Magnetic Transient Program (EMTP-RV Software) for transient studies of Power Systems***					
	General Specifications					
	1	License Type: EMTP-RV - 3.0 - Education - Education - Node lock / Stand alone				
	2	The software should be delivered in the running condition for the given				
	3	Software should include all the available libraries including Add ons.				
	4	Software Maintenance Support: maintenance and technical Support should				
	5	Training and Technical Support should be included in the software package				
13	***Digsilent Power Factory for Power Systems stability studies***					
	General Specifications					
	1	License Type: Network Perpetual , Version 15.2				
	2	The software should be delivered in the running condition for the given licences on the provided machines				
	3	Software should include all the available libraries including Add ons.				
	4	Software Maintenance Support: maintenance and technical Support should be provided. Free updates will be provided if any. Technical Support should be offered through telephone, e-mail, and Web assistance provided by				
	5	Training and Technical Support should be included in the software package				
	Aspen Disrtiview for Distribution systems operation studies					

	General Specifications					
14	**1**	License Type: Network Perpetual , Version 10.2				
	2	The software should be delivered in the running condition for the given licences on the provided machines				
	3	Software should include all the available libraries including Add ons.				
	4	Software Maintenance Support: maintenance and technical Support should be provided. Free updates will be provided if any. Technical Support should be offered through telephone, e-mail, and Web assistance provided by				
	5	Training and Technical Support should be included in the software package				
Grand Total						

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
1	***ANSYS software for Acedemic Research Mechanical and CFD***				
	Option and Accessories				
	Training				
	Technical Support				
	Installation				
	License Type				
	Node Lock/Network				
	Delievery (Downoad/CD)				
	Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
2	***HYSYS software***				
	Option and Accessories				
	Training				
	Technical Support				
	Installation				
	License Type				
	Node Lock/Network				
	Delievery (Downoad/CD)				
	Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
3	***IPSEpro Software***				
	Option and Accessories				
	Training				
	Technical Support				
	Installation				
	License Type				
	Node Lock/Network				
	Delievery (Downoad/CD)				
	Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
4	***Flue Gas Analyzer***				
	General Specifications:				
	Gases Measured: O2, CO, SO2, NO, NO2, CO2				
	Ranges Available: upto 0-50.0% O2 upto 0-50.0% CO2 up to 0-9999 PPM CO up to 0-5000 PPM NO up to 0-1000 PPM NO2 up to 0-3000 PPM SO2				
	Net Stack Temperature 0-1000 °C				
	Resolution: 0.1% on percent ranges 1 PPM				
	Accuracy and Repeatability				
	Response Time				
	Ambient Temperature Ranges:32° to 122°F (0 to 50°C)				
	Linearity: ±1% of full scale for each gas measured				
	Size and Weight				
	Power: Battery operation (volts) Recharging (220VAC 50Hz)				
	Output Options (mA and V) for each gas measured				
	Maker: US, Europe, Japan, or equivalent				
	Option and Accessories				
	Equipment with similar or better specs will be considered				
	Bidders are also required to name the existing satisfied users in Pak for their manufacturer				
	Printer				
	Data Logger				
	Warranty				
	Operation and Maintance				
	Shipment /Transportation				
	Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
5	***Engine Gas Analyzer***				
	General Specifications:				
	Method of Detection: CO, CO2,CO, NO, NO2, and O2				
	Available Ranges: 0-10.00% CO 0-10,000 PPM CO 0-5,000 PPM NOx (as NO) 0-20,000 PPM HC's 0-50.0% O2 0-50.0% CO2 0-1000 PPM NO2				
	Resolution: 0 to 0.1% on % ranges 1 PPM				
	Accuracy and Repeatability				
	Response Time				
	Ambient Temperature Range: 0 to 50°C				
	Linearity: ± 1.0% of full scale each gas measured				
	Size And Weight				
	Power: 220VAC, 50/60Hz For recharging				
	Optional Outputs (mA and V) for each gas measured				
	Maker: US, Europe, Japan, or equivalent				
	Option and Accessories				
	Equipment with similar or better specs will be considered				
	Bidders are also required to name the existing satisfied users in Pak for their manufacturer				
	Printer				
	Data Logger				
	Warranty				
	Operation and Maintance				
	Shipment /Transportation				
	Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
6	***High Speed Camera***				
	General Specifications:				
	CMOS sensor				
	Resolution 1280x800				
	Pixel (8 to 15-Bit Pixel Depth)				
	Maximum Speed (upto 100000 FPS)				
	Full Reolution (upto 3500 FPS)				
	Shutter(Hand Free/Remote)				
	High-resolution timing system:Better than 40 ns resolution				
	Extreme Dynamic Range				
	Memory Segmentation:Up to 64 segment				
	HD-SDI port				
	Built-in Memory:upto 64GB				
	Dimension				
	Weight				
	Power Supply				
	PC Software				
	Ethernet				
	Maker: US, Europe, Japan, or equivalent				
	Option and Accessories				
	Equipment with similar or better specs will be considered				
	Bidders are also required to name the existing satisfied users in Pak for their manufacturer				
	Printer				
	Data Logger				
	Warranty				
	Operation and Maintance				
	Shipment / Transportation				
	Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
7	***Infrared camera***				
	General Specifications:				
	Detector Type				
	Spectral range (1 to 5um)				
	Temperature range: 0 to 1000 C				
	Resolution				
	Detector Pitch				
	Pixel Clock				
	Integration time: 500ns to Full Frame				
	Altitude 0-40000 Feet				
	Focal Length				
	Dimension				
	Power				
	Weight				
	Maker: US, Europe, Japan, or equivalent				
	Option and Accessories				
	Equipment with similar or better specs will be considered				
	Bidders are also required to name the existing satisfied users in Pak for their manufacturer				
	Printer				
	Data Logger				
	Warranty				
	Operation and Maintance				
	Shipment or Transportation				
	Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
8	***Gas Chromoatgraphy Mass Spectrophometer***				
	General Specifications:				
	Mass Spectrophotometer				
	Mode				
	Ion Source Type (EI/CI/PCI/NCI)				
	Ion source temperature: 50–350 °C				
	Quadrupole temperature: 106–200 °C				
	MassAnalyzer: Monolithic hyperbolic quadrupole upto 12000 u/s				
	Mass range: 1.6–1200 u				
	Mass Resolution				
	Scanning Capabilities upto 21000 u/s				
	Gas Chromoatgraphy				
	Instant Constant Modules				
	AutoSampler				
	Oven Temperature				
	Oven Performance				
	Hydrogen Kit Option				
	Column Oven				
	Gas Clean Carrier				
	Helium Cylinder with regulator				
	UPS				
	Maker: US, Europe, Japan, or equivalent				
	Option and Accessories				
	Equipment with similar or better specs will be considered				
	Bidders are also required to name the existing satisfied users in Pak for their manufacturer				
	Printer				
	Data Logger				
	Warranty				
	Installation, Operation and Maintance				
	Shipment /Transportation				
	Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
9	***Thermal Conductivity analyzer***				
	General Specifications:				
	Method: Guarded Heat Flow Meter				
	Specimen Compatibility: solids, thin films, etc.				
	Specimen Thickness: Maximum 1″				
	Specimen Diameter: 50 mm (negotiable)				
	Temperature Range: -20°C to 500°C (negotiable				
	Thermal Conductivity Range: 0.1 to 40 W/mK or larger				
	Thermal Resistance Range				
	Accuracy				
	Reproducibility				
	Dimensions				
	Maker: US, Europe, Japan, or equivalent				
	Option and Accessories				
	Equipment with similar or better specs will be considered				
	Bidders are also required to name the existing satisfied users in Pak for their manufacturer				
	Printer				
	Data Logger				
	Warranty				
	Operation and Maintance				
	Shipment /Transportation				
	Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
10	***Particle Image Velocitemerty***				
	General Specifications:				
	PIV Laser				
	Light Sheet Base Module				
	Light Sheet Entrance Module				
	Light Sheet Angle Module				
	Camera Detector				
	Camera Endoscope				
	Camera Resolution				
	Camera Frame Rate				
	Detector Lens				
	Detector Lens Size				
	High Performance Filter				
	Frame Grabber				
	Time Boxer				
	PC				
	Voltage				
	Frequency				
	Power Input				
	Software				
	2D PIV Add on Dynamic Studio				
	Maker: US, Europe, Japan, or equivalent				
	Option and Accessories				
	Equipment with similar or better specs will be considered				
	Bidders are also required to name the existing satisfied users in Pak for their manufacturer				
	Printer				
	Data Logger				
	Warranty				
	Operation and Maintance				
	Shipment /Transportation				
	Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
11	***Bomb Calorimeter***				
	General Specifications:				
	Measuring Mode(Dynamic/isoperibol)				
	Maximum Energy Range: 0 to 50000 J				
	Time per Test				
	Resolution of Temperature				
	Operating Oxygen Pressure upto 50 bar				
	Display				
	Set Temperature Settings upto 35C				
	Operator Time upto 1min				
	Bucket Fill				
	Weight				
	Dimensions				
	Ambient Temperature				
	Voltage				
	Frequency				
	Power Input				
	Oxygen Filling				
	Option and Accessories				
	Equipment with similar or better specs will be considered				
	Bidders are also required to name the existing satisfied users in Pak for their manufacturer				
	Consumble				
	Printer				
	Data Logger				
	Warranty				
	Operation and Maintance				
	Shipment /Transportation				
	Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
12	***Combustion Test Facility***				
	General Specifications:				
	Combustion Chamber				
	Burner with natural gas, LPG , Oil and Diesel				
	Air ventilation, safety and drain valves				
	Temperature Sensors upto 1000C				
	Pressure Regulator (upto 10 bar)				
	Flame Sensors				
	Flow Sensors (upto 300 Kg/hr)				
	Pressure Sensors				
	Combustion Gas Analyzer				
	Flame Detection Sensor				
	Ignition Controller				
	Sampling velocity up to 500 KS/s (Kilo samples per second)				
	Data Acquisition System				
	Data Management Software				
	Maker: US, Europe, Japan, or equivalent				
	Option and Accessories				
	Equipment with similar or better specs will be considered				
	Bidders are also required to name the existing satisfied users in Pak for their manufacturer				
	Assembly and Installation				
	Cables and Accessories				
	Printer				
	Data Logger				
	Warranty				
	Operation and Maintance				
	Shipment / Transportation				
	Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
13	***Steam Generation Test Facility***				
	General Specifications:				
	Boiler (Oil/Diesel/Gas Fired, upto 2MPa, Steam Temperature upto 250C, control panel)				
	Superheater (upto 300C)				
	Fuel Tank				
	Burner				
	Steam Turbine (upto 5KW)				
	Feed Water Tank with feed water treatment system				
	Water Cooled Condenser				
	Condensate Pump				
	Feed Water System				
	Presure Sensors				
	Temperature Sensors				
	Flow Sensors for Fuel				
	Flow Sensors for Cooling Water				
	Speed Sensor				
	Power Measurement				
	Control Panel				
	Data Acquisition System				
	Data Management Software				
	Voltage				
	Frequency				
	Power Input				
	Maker: US, Europe, Japan, or equivalent				
	Option and Accessories				
	Equipment with similar or better specs will be considered				
	Bidders are also required to name the existing satisfied users in Pak for their manufacturer				
	Installation				
	Printer				
	Warranty				
	Operation and Maintance				
	Shipment/Transportation				
	Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
14	***Viscometer***				
	General Specifications:				
	Measuring range: 20upto 510 000 000 mPa·s (cP)				
	Temperature range: -20 upto+200 °C				
	length of measuring probe; upto 500 mm				
	Power Supply				
	Display Index				
	Dimensions				
	Analysis Unit				
	Weight				
	Maker:US,Canada,Europe,Japan or quivalent				
	Option and Accessories				
	Equipment with similar or better specs will be considered				
	Bidders are also required to name the existing satisfied users in Pak for their manufacturer				
	Consumble				
	Printer				
	Data Logger				
	Warranty				
	Operation and Maintance				
	Shipment /Transportation				
	Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
15	***Water Analyzing Meter***				
	General Specifications:				
	pH				
	conductivity				
	resistivity				
	TDS				
	salinity				
	Ranges -2,0 ... 20,0 / -2,00 ... 20,00 / -2,000 ... 20,000 pH				
	Power Supply				
	Display Index				
	Dimensions				
	Analysis Unit				
	Weight				
	Maker:US,Canada,Europe,Japan or quivalent				
	Option and Accessories				
	Equipment with similar or better specs will be considered				
	Bidders are also required to name the existing satisfied users in Pak for their manufacturer				
	Consumble				
	Printer				
	Data Logger				
	Warranty				
	Operation and Maintance				
	Shipment / Transportation				
	Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
16	***Material Thickness Meter***				
	General Specifications:				
	Measurement range 0 ... 1,000 µm 0 ... 40 mils				
	Resolution 0.1 mils / 1 µm				
	Accuracy				
	Display				
	Operating Condition				
	Power				
	Dimension				
	Weight				
	Maker:US,Canada,Europe,Japan or quivalent				
	Option and Accessories				
	Equipment with similar or better specs will be considered				
	Bidders are also required to name the existing satisfied users in Pak for their manufacturer				
	Consumble				
	Printer				
	Warranty				
	Operation and Maintance				
	Shipment / Transportation				
	Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
17	***Hygrometer***				
	General Specifications:				
	Measurement range				
	Temperature -50°C upto +500 °C				
	Air humidity 0 to 100 % r.H. (non-condensing)				
	Dew Point -30C upto +100 °C				
	Resolution				
	Temperature Resolution 0.1 °C				
	Air humidity Resolution 0.1 % r.H.				
	Dew point Reolution 0.1 °C				
	Temperature Accuracy				
	Air humidity Accuracy				
	Optic				
	Emission level				
	IR wave length				
	Laser class				
	Laser wave length				
	Max. laser output capacity				
	Operating conditions				
	Surrounding conditions				
	Power Supply				
	Dimensions				
	Weight				
	Maker:US, Europe,Japan or quivalent				
	Option and Accessories				
	Equipment with similar or better specs will be considered				
	Bidders are also required to name the existing satisfied users in Pak for their manufacturer				
	Consumble				
	Printer				
	Data Logger				
	Warranty				
	Operation and Maintance				
	Shipment / Transportation				
	Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
18	***Rotameter***				
	Qty:3				
	General Specifications:				
	Air Flow rate 0.2 l/h to 6300 l/h 150 psi				
	Water Flow Rate 0.002 l/h to 630 l/h				
	Temperature range upto 80C				
	Tube Length				
	Tube Diameter				
	Dimensions				
	Weight				
	Maker:US,Canada,Europe,Japan or quivalent				
	Option and Accessories				
	Equipment with similar or better specs will be considered				
	Bidders are also required to name the existing satisfied users in Pak for their manufacturer				
	Consumble				
	Warranty				
	Operation and Maintance				
	Shipment / Transportation				
	Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
19	***Pressure Guage***				
	Qty:5				
	General Specifications:				
	Measurement upto 1 bar				
	Accuracy ±0.6 %				
	Stainless Steel				
	Dimensions				
	Analysis Unit				
	Weight				
	Maker:US,Canada,Europe,Japan or quivalent				
	Option and Accessories				
	Equipment with similar or better specs will be considered				
	Bidders are also required to name the existing satisfied users in Pak for their manufacturer				
	Warranty				
	Operation and Maintance				
	Shipment / Transportation				
	Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
20	***Data Logger***				
	Qty:3				
	General Specifications:				
	General Specifications				
	20 to 30 measuring channels				
	4 to 8 MB SRAM for data storage and optional removable microSD for up to 30 GB, 10 to 20 MB flash for program				
	Temperature measuring range -200^{o}C to 1000^{o}C				
	Pressure Measuring Range upto 2 Mpa				
	Flow rate upto 1000 Kg/h				
	Operating environment -30^{o}C to 70^{o}C and 80% to 95% Humidity level				
	10/100 Ethernet RJ-45 for LAN connection and CS I/O port for connection				
	Data Transmission protocols RS-232/RS-485; RJ45				
	Measure virtually any sensor, including voltage, resistive bridge, static vibrating wire, pulse, switch closure etc				
	Compatible with SDMs, multiplexers, terminal input modules, and relays.				
	Maker:US,Canada,Europe,Japan or quivalent				
	Weight				
	Cable				
	Option and Accessories				
	Equipment with similar or better specs will be considered				
	Bidders are also required to name the existing satisfied users in Pak for their manufacturer				
	Warranty				
	Installation				
	Operation and Maintance				
	Shipment /Transportation				
	Grand Total				

S. No	S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
10	**21**	***Air Compressor***				
		General Specifications:				
		Pressure upto 10 bar				
		Style				
		Compression Stage				
		Air Filter				
		Air Tank				
		Air Discharge				
		Dimensions				
		Weight				
		Maker:US, Europe,Japan or quivalent				
		Option and Accessories				
		Equipment with similar or better specs will be considered				
		Bidders are also required to name the existing satisfied users in Pak for their manufacturer				
		Warranty				
		Installation				
		Operation and Maintance				
		Shipment /Transportation				
		Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
22	***Boiler***				
	General Specifications:				
	Electric or Oil/Gas Fired				
	Pressure upto 10 bar				
	Steam temperature 200 C				
	Dimensions				
	Weight				
	Maker:US,Canada,Europe,Japan or quivalent				
	Option and Accessories				
	Equipment with similar or better specs will be considered				
	Bidders are also required to name the existing satisfied users in Pak for their manufacturer				
	Warranty				
	Installation				
	Operation and Maintance				
	Shipment / Transportation				
	Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
23	***Pump***				
	Qty:2				
	General Specifications:				
	Suction/Discharge				
	Speed				
	Capacity				
	Head upto 20m				
	Motor Output				
	Weight				
	Maker:US,Canada,Europe,Japan or quivalent				
	Option and Accessories				
	Equipment with similar or better specs will be considered				
	Bidders are also required to name the existing satisfied users in Pak for their manufacturer				
	Warranty				
	Installation				
	Operation and Maintance				
	Shipment / Transportation				
	Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
24	***Thermocouple***				
	General Specifications:				
	Type K Surface Temperature Probe (-40 to 250°C) Qty 6 Compatible with different data loggers 2m to 3m cable length Compatible with different data loggers				
	Type K Bead Probe Qty:15 Measurement range: -40 °C to 800 °C along with Maximum Temperature of Insulation (length of the teflon wire 5m to 10 m) Compatible with different data loggers				
	Type K Tapered Temperature Probe Qty:5 Type-K thermocouple with tapered tip for use in air, non-caustic gas and surface applications. Measurement range:-40 to 800ºC Compatible with different data loggers				
	Type K General Purpose Probe Qty:5 For general purpose applications Type-K thermocouple surface, air and non-caustic gases Measurement range:-40°C to 800 °C 5 to 10 inch Stainless Steel Probe Compatible with different data loggers				
	Immersion Temperature Probe for use in liquids and gels Qty:5 Measurement range: -40 to 1000°C 5 to 10 inch Stainless Steel Probe Cable Length 3 to 10 m Compatible with different data loggers				
	Pipe Clamp Temperature Probe Qty:1 Type-K thermocouple for fast temperature and superheat measurements of pipe surfaces For pipe diameters: 32 mm to 64 mm Measurement range: -40 to 800°C Compatible with different data loggers				
	High Temperature IR Thermometer Qty:1 Measure precise temperatures of up to 1500 °C from a safe distance				
	Option and Accessories				
	Equipment with similar or better specs will be considered				
	Bidders are also required to name the existing satisfied users in				
	Consumble				
	Printer				
	Data Logger				
	Warranty				
	Operation and Maintance				
	Shipment / Transportation				
	Maker:US,Europe,Japan or quivalent				
	Grand Total				

S. No	S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
9	25	***Pressure Transducer***				
		Qty:3				
		General Specifications:				
		Measurement upto 1 bar				
		Accuracy ±0.6 %				
		Stainless Steel				
		Dimensions				
		Analysis Unit				
		Weight				
		Maker:US,Canada,Europe,Japan or quivalent				
		Option and Accessories				
		Equipment with similar or better specs will be considered				
		Bidders are also required to name the existing satisfied users in Pak for their manufacturer				
		Warranty				
		Operation and Maintance				
		Shipment /Transportation				
		Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
26	***Mass Flow Meter***				
	Qty:4				
	General Specifications:				
	Temp of Fluid upto 100 C				
	Mass Flow Rate upto 350 kg/hr				
	DN 10				
	DN 25				
	DN 25				
	DN 50				
	Accuracy				
	Dimensions				
	Weight				
	Maker:US,Canada,Europe,Japan or quivalent				
	Option and Accessories				
	Equipment with similar or better specs will be considered				
	Bidders are also required to name the existing satisfied users in Pak for their manufacturer				
	Warranty				
	Installation				
	Operation and Maintance				
	Shipment / Transportation				
	Grand Total				

S. No	Description		County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
27	***Valves***	***Qty***				
	General Specifications:					
	Gate Valve DN 25	3				
	Gate Valve DN 50	3				
	Ball Valve DN 10	5				
	Ball Valve DN 25	5				
	Check Valve DN 10	3				
	Check Valve DN 25	3				
	Globe Valve DN25	3				
	Globe Valve DN 50	3				
	Maker:US,Canada,Europe,Japan or quivalent					
	Option and Accessories					
	Equipment with similar or better specs will be considered					
	Bidders are also required to name the existing satisfied users in Pak for their manufacturer					
	Warranty					
	Installation					
	Operation and Maintance					
	Shipment / Transportation					
	Grand Total					

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
28	***Pipe***				
	General Specifications:				
	DN10 (Total upto 50m)				
	DN25 (Total upto 50m)				
	DN50 (Total upto 50m)				
	Maker: US, Europe, Japan or quivalent				
	Option and Accessories				
	Equipment with similar or better specs will be considered				
	Bidders are also required to name the existing satisfied users in Pak for their manufacturer				
	Warranty				
	Installation				
	Operation and Maintance				
	Shipment or Transportation				
	Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
29	***Thermal Insulation Tape for Pipe***				
	General Specifications:				
	Type				
	Backing				
	Width				
	Thickness				
	Temperature Resistance				
	Maker: US, Europe, Japan or quivalent				
	Option and Accessories				
	Equipment with similar or better specs will be considered				
	Bidders are also required to name the existing satisfied users in Pak for their manufacturer				
	Warranty				
	Operation and Maintance				
	Shipment or Transportation				
	Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
1	***X-Ray Powder Diffractometer***				
	General Specifications:				
	XRD with variable diameter from 400 to 600 on pre define intervals.				
	Silicon Strip detector without the need of secondary monochromator.				
	Goniometer theta / theta with step size 0.0001				
	Variable resolution and intensities with change of radius				
	Water chiller with ambient temperature of 45Plus degree				
	X-ray tube with twist technology to change from line to point focus				
	without the need of tube removal				
	Option for parallel and Braggs Geometry with one click of computer				
	Thin film application.				
	Powder, liquid, samples.				
	Cu x-ray tube 2.2 KW				
	X-ray generator 3 Kw with 1mA and 1Kw increment full computer control				
	Full Plug and play with guaranteed alignment for +,- 0.01 degree for Corundum NIST 1976b sample.				
	Equipment with similar or better specs will be considered				
	Maker: US, Europe, Japan, or equivalent				
	Options & Accessories:				
	Sample Holders				
	UPS backup				
	Shipment /transportation				
	Warranty with technical support				
	Installation and operational training				
	Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
2	***Thermal Dilatometer***				
	General Specifications:				
	Max Temperature range ~1550°C				
	Preferable smaple size 14mm (max)				
	Sample Holder = Fused silica, Alumina, sppphire graphite, or tungsten				
	Temperature resolution = 0.05-0.1°C or less				
	Length resolution 10 nm				
	CTE accuracy = 0.05*10-6/K or less				
	Equipment with similar or better specs will be considered				
	Maker: US, Europe, Japan, or equivalent				
	Options & Accessories:				
	Highly stable and accurate Heating elements and thermocouple				
	UPS backup				
	Controlled environment (air, vacuum, inert)				
	Warranty with technical support				
	Shipment/ transportation				
	Installation and operational training				
	Other Miscellaneous necessary items recommended (Expndables, etc)				
	Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
3	***LCR meter***				
	General Specifications:				
	Frequency range Hz upto 3 MHz				
	Accuracy of set frequency ±0.005%				
	Approximate Measurement ranges = Resistnace > 2GΩ, Capacitance > 1F, Inductnace >2kH				
	LCD display with backlighting				
	Bidders are also required to name the existing satisfied users in Pak for their Principal				
	Equipment with similar or better specs will be considered				
	Maker: US, Europe, Japan, or equivalent				
	Options & Accessories:				
	Overload protection unit				
	Heating source upto 1000C and specimen holder. Integratble with the LCR meter				
	Warranty with technical support				
	Standard cables and wires				
	Installation and training				
	Shipment/ transportation				
	Operating/Maintenance Manual				
	Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
4	***Scanning Electron Microscope (SEM)/EDS Thermionic***				
	General Specifications:				
	Thermal emission gun with extraordinary emission stability				
	Resolution=				
	HV mode: 3 nm at 30 kV / 2 nm at 30 kV ,				
	LV Mode: 3.5 nm at 30 kV / 2.5 nm at 30 kV				
	Magnification: preferably up to X900000				
	Minimum X-Y-Z Stage movement is X= 80mm Y= 60mm Z= 47mm				
	Voltage = 200 V – 30 kV or so				
	Probe current requirement = pA to μA				
	Filaments= Tungsten or preferably the LaB6				
	Detectors= BSE detector, SE detector Probe current measurement; Touch alarm				
	Equipment with similar or better specs will be considered				
	Maker: US, Europe, Japan, or equivalent				
	Options & Accessories:				
	Additional filaments				
	Compatible software				
	EDS detectors				
	Automatic Sputter coater for sample preparation				
	UPS backup				
	Installation and training				
	Warranty with technical support				
	Shipment /transportation				
	Operating/Maintenance Manual				
	Grand Total				

Advance Energy Materials and Characterization Lab

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
5	***Lab scale Potentiostat/Galvanostat (EIS)***				
	General Specifications:				
	Interface potentiostat with Galvanostat				
	Dr. Bob Cell Kit, Jacketted				
	Glassy Carbon Working Electrode, 3 mm				
	Platinum Working Electrode, 3 mm				
	Saturated Calomel Reference Electrode				
	Vycor Tips (Pkg/5)				
	Saturated Potassium Chloride				
	Electrode Polishing Kit				
	Gold Working Electrode, 3 mm				
	Bidders are also required to name the existing satisfied users in Pak for their Principal				
	Equipment with similar or better specs will be considered				
	Maker: US, Europe, Japan, or equivalent				
	Options & Accessories:				
	Global software liscence				
	Licesenced softwares such as: Corrosion Software License, Electrochemical Frequency Modulation, Critical Pitting Temperature, Physical Electrochemistry, Electrochemical Impedance, Pulse Voltammetry, Electrochemical Signal Analyzer, Virtual Front Pane, Electrochemical Energy, Electrochemical Noise Experiment				
	Warranty with technical support				
	Installation and training				
	Shipment / transportation				
	Operating/Maintenance Manual				
	Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
6	***Microhardness tester***				
	General Specifications:				
	Preffered Main Load = 10gf to 1kgf				
	Magnification 500x-1000x(max)				
	Hardness test scales Vicker and knoop (HV, HK)				
	Motorized XY stage with compatible software				
	Indent measurement = manual/automatic				
	LCD touch display				
	Equipment with similar or better specs will be considered				
	Maker: US, Europe, Japan, China or equivalent				
	Options & Accessories:				
	Diamond indentors				
	Warranty with technical support				
	Shipment /transportation				
	Operating/Maintenance Manual				
	Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
7	***Simutaneous Thermal Ananlyzer (STA)***				
	General Specifications:				
	Horizontal Balance & Furnace				
	Temperature range = ambient to 1500°C or above				
	Heating Rate = 0.1- 100K/min				
	Sample capacity ~ 200mg				
	Balance sensitivity = 0.1µg				
	Atmosphere = vacuum, inert, air				
	Thermocouples = Platinum/Platinum-Rhodium				
	DTA Sensitivity ~ 0.001 ˚C				
	Mass Flow Controller with Automatic Gas Switching				
	Equipment with similar or better specs will be considered				
	Maker: US, Europe, Japan, or equivalent				
	Options & Accessories:				
	UPS backup				
	Installation and training				
	Warranty with technical support				
	Shipment / transportation				
	Operating/Maintenance Manual				
	Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
8	***UV-Vis-NIR Spectrophotometer***				
	General Specifications:				
	Dual Deutrium (30W)- Quartz Tungsten Halogen (100W) light source				
	1" Beam Condensing Assembly Fused Silica (UV Applications)				
	Standard Monochromator/Spectrograph				
	Modes = absorbance, reflectance and transmittance				
	Sample specifications= Liquids and solids (films)				
	Gratings of different sizes (50x50x9.5mm 1200l/mm @ 400nm, 50x50x9.5mm 1200l/mm @ 1000nm, 50x50x9.5mm 600l/mm @ 1250nm) alongwith holders				
	Bilaterally Adjustable Slit				
	Optical Coupling For Sample Chamber to Monochromator/Spectrograph - Fused Silica Lens (UV)				
	Standard Sample chamber				
	Equipment with similar or better specs will be considered				
	Maker: US, Europe, Japan, or equivalent				
	Options & Accessories:				
	Single channel detector mount				
	Installation and training				
	Shipment/ transportation				
	Operating/Maintenance Manual				
	Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
9	***Class AAA Compact Solar Simulator***				
	General Specifications:				
	Current-Voltage Measurement System IV tester, 20W version or so.				
	Air mass filter				
	Arc lamp housing, 1 arc lamp, power supply with igniter, filter holder and testing report				
	Equipment with similar or better specs will be considered				
	Maker: US, Europe, Canada, Japan, or equivalent				
	Options & Accessories:				
	Compatible standard accessories				
	Caliberated reference cell				
	UPS backup				
	Warranty with technical support				
	Installation and training				
	Shipment/ transportation				
	Operating/Maintenance Manual				
	Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
10	***Lab scale spray dryer***				
	General Specifications:				
	Max capacity: 1500ml/h Temperature range of Inlet air: 30℃ -280℃ Temperature range of outlet air: 40℃ -120℃ Precision of temperature: ± 1 ℃ Dryer time: 1.0-1.5 S Speed of squirmy pump: 30-1500ml/h Consume of dryer air: 0-330m3 /h, max pressure: 686Pa Consume of spray air: 0-4.2m3 /h, spray pressure: 2-5bar Spray system: 2 liquid nozzles with standard 0.7mm jet Power: 3.5KW 200-230V Dimensions: 650×500×1550 (mm) L x W x H				
	Equipment with similar or better specs will be considered				
	Maker: US, Europe, Japan, China or equivalent				
	Options & Accessories:				
	Standard and complete accessories				
	UPS backup				
	Installation and training				
	Operating/Maintenance Manual				
	Shipment / transportation				
	Warranty with technical support				
	Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
10	***High speed lab scale centrifugal spray dryer***				
	General Specifications:				
	Evaporation capacity: 5kg/h				
	Diameter of spray tower upto 1.0m				
	Heating media: electric 12kW or so				
	Inlet temperature:0~250 ajdustable				
	Steel made drying tower				
	Heater made up of steel				
	Cyclone made up of steel				
	Equipment with similar or better specs will be considered				
	Maker: US, Europe, Japan,China or equivalent				
	Options & Accessories:				
	Standard and complete accessories				
	UPS backup				
	Installation and training				
	Operating/Maintenance Manual				
	Shipment / transportation				
	Warranty with technical support				
	Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
11	***Plasma Enhanced CVD System (400 C) with quartz chamber***				
	General Specifications:				
	Plasma generator power: 230VAC, 50/60 Hz, < 100W or so				
	Heating range upto 400C or better				
	Output frequency upto 12MHz				
	Plasma generator Quartz tube Chamber size ID 2.5" or large, OD 3" or large				
	Standard Vacuum and gas fittings				
	Bidders are also required to name the existing satisfied users in Pak for their Principal				
	Equipment with similar or better specs will be considered				
	Maker: US, Europe, Japan, China or equivalent				
	Options & Accessories:				
	Floating flow meter with mechanical pressure gauge including pipe fitting				
	Heavy duty mobile cart (Two shelves or more)				
	Double step rotary vane vacuum pump				
	UPS Backup				
	Warranty with technical support				
	Installation and training				
	Shipment/ transportation				
	Operating/Maintenance Manual				
	Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
12	***Gaussian software for simulation***				
	General Specifications:				
	Guassian 09W for Windows 64 bit for multiprocessing systems				
	Options & Accessories:				
	Installation and training				
	Operating/Maintenance Manual				
	Certification				
	Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
13	***DC/RF Dual head High vacuum Magnetron plasma sputtering coater with film thickness tracking system***				
	General Specifications:				
	Source power: DC 500W, RF 600W				
	Target diameter requirement upto 2"				
	Applicable for non-conducting and metallic samples				
	Sputtering head Thickness range 0.1-5mm or more				
	Vacuum Chamber: 300 mm Dia x 300 mm Ht. or larger				
	Mass flow controllers				
	Controlled water cooling sytem				
	Integrated vaccum pumps (mechanical and turbo)				
	Quartz crystal thickness monitor				
	Sample holder (rotateable) size: 120mm dia. or larger The holder temperature: RT to 550°C Max with high accuracy				
	Equipment with similar or better specs will be considered				
	Bidders are also required to name the existing satisfied users in Pak for their Principal				
	Maker: US, Europe, Japan, china or equivalent				
	Options & Accessories:				
	RF cable				
	Sample holders with adjustable speed				
	Gas flow control unit				
	UPS backup				
	Mention the details of comprehensive mechanism of installation and training				
	Warranty with technical support				
	Shipment/ transportation				
	Operating/Maintenance Manual				
	Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
14	***Thin film and coating analysis system with measuring capability***				
	General Specifications:				
	Measurability of various types of coating thickness				
	Precision upto 0.01%, Accuracy 0.2% or 10A				
	Sample size: 1mm or large				
	Software				
	Measuring standards				
	Spot size upto 3mm				
	Equipment with similar or better specs will be considered				
	Bidders are also required to name the existing satisfied users in Pak for their Principal				
	Maker: US, Europe, Japan, equivalent				
	Options & Accessories:				
	Compatible software				
	Warranty with technical support				
	Mention the details of comprehensive mechanism of installation and training				
	Shipment / transportation				
	Operating/Maintenance Manual				
	Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
15	***Plasma cleaner with digital vacuum gauge***				
	General Specifications:				
	vacuum Gauge & Display, needle valves				
	Approx 6"Dx 6"L Quartz Chamber, 13.56 Mhz, 30W max				
	Environment: air, vacuum, inert				
	Vacuum gauge with display				
	compatible Vacuum pump				
	Equipment with similar or better specs will be considered				
	Bidders are also required to name the existing satisfied users in Pak for their Principal				
	Maker: US, Europe, Japan, China or equivalent				
	Options & Accessories:				
	Standard vacuum flanges and fittings				
	Warranty with technical support				
	Mention the details of comprehensive mechanism of installation and training				
	Shipment / transportation				
	Operating/Maintenance Manual				
	Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
16	***Desktop Machine shop***				
	General Specifications:				
	Desktop High speed Cut-off saw with three 2" cutting blades and 1x Vise for fixing up saw 2.75" (70mm) x 6.0" (152mm) crosslide, pulleys, belt, faceplate, lathe dog, two dead centers, three hexagonal keys, sharpened high-speed steel cutting tool, eight-foot, three-wire power cord and instruction booklet 24" (610mm) bed				
	Desktop precision lathe 3.5 x 17-inch with standard accessories				
	High prcision micromilling machine upto 20000rpm with standard accessories				
	Micrmilling table szie: (200 x 70mm), Micrmill XY travel: (134 and 46mm)				
	Standard tool-kit with complete items				
	Precision Micro Drilling Machine up to 7000 RPM or larger worktable size 8 21/32" x 4 23/32", 220 x 120 mm or comaptible				
	6x diamond head drill bit				
	Equipment with similar or better specs will be considered				
	Bidders are also required to name the existing satisfied users in Pak for their Principal				
	Maker: US, Europe, Japan, China or equivalent				
	Options & Accessories:				
	Warranty with technical support				
	Installation and training				
	Shipment/ transportation				
	Operating/Maintenance Manual				
	Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
17	***Tape casting film coater with dryer, vacuum chuck and adjustable film applicator***				
	General Specifications:				
	Traverse speed 0-100mm/sec with accuracy 10mm/sec				
	Film applicator with adjustable thickness of coating				
	Stroke Length 10 - 250 mm adjustable				
	Heater (Heating Cover) with max temperature up to 100C or so				
	Dimension: 500mm(L) x 300mm(W) x 290mm(H) or closer				
	Equipment with similar or better specs will be considered				
	Bidders are also required to name the existing satisfied users in Pak for their Principal				
	Maker: US, Europe, Japan, China or equivalent				
	Options & Accessories:				
	Standard vacuum pump (optional)				
	Warranty with technical support				
	Comprehensive installation and training				
	Shipment / transportation				
	Operating/Maintenance Manual				
	Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
18	***Bench-Top NanoFiber Electrospinning System Unit with Multi-Collectors & Heater***				
	General Specifications:				
	Mx power: 1500W, Digital control of various features like Rotating mandrel speed, Spin Duration, Syringe pump flow rate etc. Rotating Mandrel targets of varying diameters. System hood with Exhaust fan, halogen lighting and transparent door. Built-in Arc Protection Circuit				
	High Voltage Power Supply ~ 0 - 30kV				
	Syringe dispensing system controlled by PC for dispensing standard 2.5 to 50 ml (or larger) glass syringes				
	Three types of collectors: Drum collectors: Multi-sets of various sizes compatible with the system and with adjustable speed 300 to 4000rpm Suitable Plate collector made with SS with proper grounding XY Plate Collector made with SS, suitably sized and grounding				
	Halogen light heater				
	Standard fume hood unit				
	Compatible Software				
	Equipment with similar or better specs will be considered				
	Maker: US, Europe, Japan, China or equivalent				
	Options & Accessories:				
	Multi axes spray nozzle (optional)				
	Warranty with technical support				
	Mention the details of comprehensive mechanism of installation and training				
	Shipment / transportation				
	Operating/Maintenance Manual				
	Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
19	***Large Stainless Steel Vacuum Glove Box with Airlock Chamber***				
	General Specifications:				
	Standard glove box chamber size: Chamber Size: 40"x25"x32" or better				
	Air lock chamber				
	Glovebox chamber: Max. Positive Pressure: 810 Torr (1.1 atm) Max. Vacuum Level: 0.5 Torr				
	Transparent Front Panel Removable for putting in devices 2-3mm thick glass				
	Leakage rate in glove box upto ≤3 torr/hour				
	Standard package				
	Compatible vacuum gauge and valves				
	Equipment with similar or better specs will be considered				
	Maker: US, Europe, Japan, China or equivalent				
	Options & Accessories:				
	Oxygen monitoring unit				
	Additional Latex Gloves				
	Power extension socket				
	High speed vacuum pump				
	Standard vacuum flanges and fittings				
	Warranty with technical support				
	Mention the details of comprehensive mechanism of installation and training				
	Shipment and transportation				
	Operating/Maintenance Manual				
	Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
20	***Mini CVD tube furnace***				
	General Specifications:				
	Heating range 1200C or above, working temperature ≥ 1100C				
	Heating rate ≤ 10C/min				
	Quartz Processing tube with dimensions 55*45*450mm (OD*ID*Length)				
	Two channel gas mixing station				
	PID automatic control unit with overheating & broken thermocouple protection				
	Bidders are also required to name the existing satisfied users in Pak for their Principal				
	Equipment with similar or better specs and quality will be considered				
	Maker: US, Europe, Japan, China or Equivalent				
	Options & Accessories:				
	Oxygen monitoring unit				
	Digital vacuum gauge				
	High speed vacuum pump				
	Standard vacuum flanges and fittings				
	Warranty with technical support				
	Mention the details of comprehensive mechanism of installation and training				
	Shipment / transportation				
	Operating/Maintenance Manual				
	Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
21	***Ultrasonic spray nozzle with power controller***				
	General Specifications:				
	ultrasonic output 0-130W				
	Ultrasonic PZT converter with diameter ≤ 30mm				
	Average drop size upto 30micron				
	Spraying rate 5ml/min- 40ml/min				
	Bidders are also required to name the existing satisfied users in Pak for their Principal				
	Equipment with similar or better specs will be considered				
	Maker: US, Europe, Japan, China or Eqvlnt				
	Options & Accessories:				
	Heating plate				
	Two spray nozzles (one cylindrical, one cone shaped)				
	Infusion syringe pump (0-25ml/min) with standard accessories				
	Warranty with technical support				
	Mention the details of comprehensive mechanism of installation and training				
	Shipment / transportation				
	Operating/Maintenance Manual				
	Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
22	***Mounting press***				
	General Specifications:				
	Temperature control range 50C-200C				
	Time control range upto 30min				
	Hand wheel with pressure ready sensor				
	Bidders are also required to name the existing satisfied users in Pak for their Principal				
	Equipment with similar or better specs will be considered				
	Maker: US, Europe, Japan, or equivalent				
	Options & Accessories:				
	Compression Mounting powder				
	Warranty with technical support				
	Installation and training				
	Shipment/transportation				
	Operating/Maintenance Manual				
	Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
23	***Agate mortars (quantity: 4)***				
	General Specifications:				
	Diameters: 3" , 7" (2 pieces for each category)				
	Preferable material: Silica based material				
	Item with similar or better specs will be considered				
	Bidders are also required to name the existing satisfied users in Pak for their Principal				
	Options & Accessories:				
	Standard and complete accessories				
	Shipment / transportation				
	Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
24	***Multi-function coater with turbo pump: Plasma sputtering+Evaporating+ Carbon coating***				
	General Specifications:				
	Max. Temperature range upto 1800C				
	Coating source assembly including thermal evaporation, carbon coating, plasma sputter setup				
	Argon gas working atmosphere				
	Vacuum chamber: Bell jar made up of pyrex glass with dimensions nearly 250mm*350mm (Dia*Height)				
	Equipment with similar or better specs will be considered				
	Maker: US, Europe, China, Japan, or equivalent				
	Options & Accessories:				
	Two inner glass tubes for radiation blocking				
	Standard and complete accessories				
	High speed turbo vacuum pump				
	Mention the details of comprehensive mechanism of installation and training				
	Operating/Maintenance Manual				
	Shipment and transportation				
	Warranty with technical support				
	Shipment / transportation				
	Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
25	***Fuel Cell Testing System for Solid Oxide Fuel Cells***				
	Dimensions: 28" x 40" x 59" (W x D x H)				
	High temperaure testing: RT-800C or above				
	Automated design				
	Highly efficient gas handling System				
	characteristics				
	PID control with auto tuning				
	Flow rate control system				
	Support modules such as electronic load, gas dew point, etc.				
	Integrated fuel cell chamber				
	Software for testing and data analysis				
	Equipment with similar or better specs will be considered				
	Maker: US, Europe, Canada, Japan, China or equivalent				
	Options & Accessories:				
	Standard accessories gas regulators, temp controller, furnace, thermocouples, etc				
	UPS backup				
	Gas Inlet Pressure Regulation				
	Warranty with technical support				
	Installation and training				
	Operating/Maintenance Manual				
	Shipment / transportation				
	Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
26	***High Velocity Oxygen Fuel (HVOF) coating setup***				
	Flame speed: 2000m/s or higher				
	Flame temperature: 3000C or higher				
	Acetylene pressure and flux: 0.65MPa 88L/min or higher				
	Carrier gas pressure: 1MPa or higher				
	Powder feed via Atomizaion and pressure				
	Carrier gas: Nitrogen (N2)				
	Feed powder speed: 0~150 g/min or higher				
	Equipment with similar or better specs will be considered				
	Maker: US, Europe, Japan, China or equivalent				
	Options & Accessories:				
	Compatible compressor with compressed air flow rate of 4m3/min (include dryer, air tank and filters)				
	Lab scale grit blaster				
	Warranty with technical support				
	Shipment / transportation				
	Installation and training				
	Operating/Maintenance Manual				
	Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
27	***Lab scale Acid cabinet unit (Non-metallic)***				
	Cabinet dimensions: 165*109*64cm (H*W*D) or so				
	Bidders are also required to name the existing satisfied users in Pak for their Principal				
	Maker: US, Europe, Japan, China or equivalent				
	Options & Accessories:				
	Standard accessories				
	Shipment / transportation				
	Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
28	***Mini table high speed centrifuge***				
	RPM: 5000 or above				
	Preffered Dimensions: 30cm*35cm*30cm (preferably)				
	Bidders are also required to name the existing satisfied users in Pak for their Principal				
	Maker: US, Europe, Japan, or equivalent				
	Options & Accessories:				
	Compatible standard accessories				
	Warranty with technical support				
	Mention the details of comprehensive mechanism of installation and training				
	Operating/Maintenance Manual				
	Shipment / transportation				
	Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
29	***Complete Atmospheric plasma spray system for powder coating***				
	High temperature plasma forming capability to melt all kind of metals and ceramics				
	High quality plasma spray gun with efficient powder feeder				
	Standard power supply and control cabinet				
	Capability of plasma forming in inert gas medium				
	High quality/efficient powder feeder				
	Compressor system				
	Efficient cooling medium				
	Equipment with similar or better specs will be considered				
	Maker: US, Europe, Japan, China or equivalent				
	Options & Accessories:				
	Compatible standard accessories				
	Additional gasses: Acetylene, Nitrogen and Oxygen				
	Warranty with technical support				
	Shipment and transportation				
	Operating/Maintenance Manual				
	Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
30	***Lab scale Laser Granulometer***				
	Approximate Measurable particle range: 0.5-200micron or so, with minimum measurement time and high accuracy				
	Preferable Power source He-Ne Laser or equivalent				
	Detector: Multichannel Silicon photodiode detector or euivalent				
	Communication port like USB interface				
	Computer based automatic measurement control system				
	Equipment with similar or better specs will be considered				
	Maker: US, Europe, Japan, China or equivalent				
	Options & Accessories:				
	Compatible standard accessories				
	Warranty with technical support				
	Operating/Maintenance Manual				
	Shipment / transportation				
	Certificate of Calibration with results				
	Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
31	***Hall effect measurement setup***				
	Prefferable Constant current source range: nA-A				
	Prefferable Voltage covering range: 1μV to 100V or so				
	Fixed/permanent or electromagnet: Few hundred Gauss to few thousand Gauss				
	Probe source with manipulators and probe tips				
	Colinear conductivity measurement Hardware/software: Mid-range resistance, Low resistance, Low-to-high (wide range) resistance, Mid-to super-high resistance(Quote the prices for each range). The last two ranges are more suitable for our requirements.				
	Equipment with similar or better specs will be considered				
	Maker: US, Europe, Japan or Eqv.				
	Options & Accessories:				
	Heating source: -100C to 350C, RT to 350C (quote the prices for our considerations)				
	Compatible standard accessories				
	Mention the details of comprehensive mechanism of installation and training				
	Warranty with technical support				
	Operating/Maintenance Manual				
	Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
32	***Multi-arc Ion vacuum coating machine***				
	Size Ø600*H600mm, vertical type with single-door, made by high quality stainless steel (SUS304), 2 observation windows, double-deck cooling system				
	Anti-fouling stainless steel board stainless steel plate, one set				
	Workpiece rotation system 6 axis autogiration and orbital revolution type, frequency inverter and stepless speed adjustment				
	Heating control 6KW tube heater system, up to 250℃ Temperature control PID control, one set of temperature measurement and control probe				
	Vacuum Pumping System Backing pump 2X-30 slide valve pump, 1 set and diffusion pump				
	Multi-arc power, 2 sets, 2 sets new arc power, low arcing voltage, stable arc spot, difficult to arc run, low current, 1000V/500V/180V				
	MFC: Gas flow controller 3D07-7B, with SMC gas closing valve (Ar）1000sccm 1 PC (C2H2)1000sccm 1 PC (N2)3000sccm 1 PC (O2)200sccm 1PC				
	Flow display control device D08-4E 1 PC, one set Gas distribution pipeline 2 Line Efficient Electric Control Systems and Cooling system				
	Equipment with similar or better specs will be considered				
	Maker: US, Europe, Japan, China or equivalent				
	Options & Accessories:				
	Compatible standard accessories				
	Warranty with technical support				
	Shipment /transportation				
	Operating/Maintenance Manual				
	Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
33	***Semi-automatic and precision Grinder/Polisher***				
	Automated and precision controlled grinding and polishing equipment with state of art display				
	Soft start and stop function				
	Multi-workstations for grinding/polishing				
	Variable speed with digital display				
	Samples of grinding media with grit size ~1micron				
	Bidders are also required to name the existing satisfied users in Pak for their Principal				
	Equipment with similar or better specs will be considered				
	Maker: US, Europe, Japan, or equivalent				
	Options & Accessories:				
	Compatible standard accessories				
	Polishing media: diamond/alumina paste (qoute price for our considerations)				
	Warranty with technical support				
	Operating/Maintenance Manual				
	Mention the details of comprehensive mechanism of installation and training				
	Shipment/ transportation				
	Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
34	***Optical/metallurgical Microscope***				
	Complete standard accessories: Eyepieces(5x, 10x), Nosepiece, Objective lenses (10x, 20x, 50x, 100x)				
	Built-in bright/dark viewing field system				
	Efficient Illumination source with adjustable intensity				
	Equipment with similar or better specs will be considered				
	Bidders are also required to name the existing satisfied users in Pak for their Principal				
	Maker: US, Europe, Japan, or equivalent				
	Options & Accessories:				
	Compatible standard accessories				
	Mention the details of comprehensive mechanism of installation and training				
	Warranty with technical support				
	Operating/Maintenance Manual				
	Shipment/ transportation				
	Certificate of Calibration with results				
	Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
35	***Atomic Force Microscope (AFM)***				
	Decoupled flexure guided xy scanner, XY scan range: 50 µm × 50 µm, Closed-loop feedback control for precise XY positioning				
	AFM Head: Z scan range: 12 µm, Cantilever oscillation freq.: up to 600 kHz, Diode specs: wavelength: 830 nm, coherent length: ~50 µm				
	Sample: Sample size: up to 100 × 100 mm, 20 mm thickness A magnetic sample holder Voltage bias range to the sample: -10 V to 10 V Sample weight: less than 500 g				
	Manual xy stage: Travel range: Up to 13 × 13 mm				
	Z Stage travel range: 29.5 mm▪ Stage travel step: 0.5 µm				
	Direct On-Axis Optics with High-Resolution CCD and Integrated LED Illumination ▪ Intuitive direct on-axis sample view Field of view: 480 µm × 360 µm (with 10× objective lens)▪ 1.2 MP CCD camera Integrated software-controlled white LED illumination				
	CE compliant control electronics				
	Standard microscopy modes				
	Computers with monitor/s				
	Softwares				
	Bidders are also required to name the existing satisfied users in Pak for their Principal				
	Equipment with similar or better specs will be considered				
	Maker: US, Europe, S.Korea, Japan, or equivalent				
	Options & Accessories:				
	Compatible standard accessories inlcuding computer, monitors, cantilevers, cradle, sample disks, calibration gratings				
	Warranty with technical support				
	Passive Vibration Isolation (to be purchased subjected to availablity of funds)				
	Table-Top Acoustic Enclosure (to be purchased subjected to availablity of funds)				
	Operating/Maintenance Manual				
	Shipment/ transportation, etc.				
	Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
36	***Fuel cell trainer***				
	50 W fuel cell training system				
	Fuel Cell Module including 50 W fuel cell, controller, Hydrogen flow sensor, purge wall and an adjustable fan LED displays for temperature, current, Voltage , gas supply				
	Electronic load module with manual/sotware control				
	H2 storage module with metal hydride canister with a multistage pressure reducer/connection kit				
	DC/DC converter module including LCD displays for measuring load , parasitic losses and available power				
	Traffic light module				
	Instruction manual with experiment guide				
	Equipment with similar or better specs will be considered				
	Software + CD				
	Maker: US, Europe, Japan, China or equivalent				
	Options & Accessories:				
	Compatible standard accessories				
	Hydrogen generator to refill the metal hydride canisters(optional)				
	Warranty with technical support				
	Operating/Maintenance Manual				
	Shipment/ transportation				
	Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
36	***Two Zones CSS Furnace for Rapid Thermal Processing Upto 3" Dis & 650ºC***				
	Dual zone furnace, two temperature controllers, two channel gas flow meters are integrated into a mobile aluminum alloy frame The chamber is made of high purity fused quartz tube Quartz tube size: 11" OD/10.8" ID x 9" H The vacuum flanges are to be made of Stainless Steel 316 Overall dimension: 850(L)×745(W)×1615(H) mm Gas FLOW 16 -160 mL/m 400 - 4000 mL/m (for purging purpose) Max. temperature for each heaters: = 650ºC (or larger) Heating: > 8ºC/s (heating single heater only) Cooling: > 10ºC/s (600 - 100ºC) Max.				
	Bidders are also required to name the existing satisfied users in Pak for their Principal				
	Equipment with similar or better specs will be considered				
	Maker: US, Europe, Japan, China or equivalent				
	Options & Accessories:				
	Compatible standard accessories				
	vacuum pump and MFC				
	Warranty with technical support				
	Mention the details of comprehensive mechanism of installation and training				
	Operating/Maintenance Manual				
	Shipment/ transportation				
	Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
36	***Compact Vacuum Carbon & Metal Evaporating Coater***				
	AC 208 - 220V 50/60Hz , single phase 110V is available with a transform of 1500W Input Power < 1000 W Output Power 10VAC and 50A Max. Specimen chamber: Fused glass tube, 160 mm Dia. x 110mm Height 50 mm Dia.sample stage with Max. coating area: 45 mm dia 3 pcs tungsten heating coil Overall dimension : L360mm x W300mm x H380mm				
	Bidders are also required to name the existing satisfied users in Pak for their Principal				
	Equipment with similar or better specs will be considered				
	Maker: US, Europe, Japan, China or equivalent				
	Options & Accessories:				
	Compatible standard accessories				
	vacuum pump				
	Warranty with technical support				
	Mention the details of comprehensive mechanism of installation and training				
	Operating/Maintenance Manual				
	Shipment/ transportation				
	Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
36	***High Pressure Hydro-thermal Reactor 1000°C***				
	Pressure Vessel: Ni-Based Super-alloy, with 65ml capacity Air cold falnge via aluminium heat radiator 55 mm OD x 20 mm ID x 214 mm height, 65 mL capacity 50 mm Dia.sample stage with Max. coating area: 45 mm dia working temp. RT - 1100 °C Max. Presurre 36 MPa (5292 PSI) Max at 500°C 4 MPa (588 PSI) Max. at 1100°C High precison pressure monitoring PC control				
	Bidders are also required to name the existing satisfied users in Pak for their Principal				
	Equipment with similar or better specs will be considered				
	Maker: US, Europe, Japan, China or equivalent				
	Options & Accessories:				
	Compatible standard accessories such as Liner, process tube				
	Mention the details of comprehensive mechanism of installation and training				
	Warranty with technical support				
	Operating/Maintenance Manual				
	Shipment/ transportation				
	Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local) Add 17% as GST if local made item	Total Price US$/€/¥ etc.
36	***High temperature ~1800 oC muffle furnace*** ***Complete with standard accessories***				
	Temp. up to at least 1750 C Size up to at least 6"x6"x6", 3.6L or larger Kanthal Super-1800 grade MoSi2 > AC 208V-240V single phase, 50/60 Hz > Thermocouple: B Type (Pt-Rh to Pt-Rh) with Alumina tube PID automatic control Standard Power Cable > Al2O3 Sample Plate (2) > Al2O3 Furnace Door Block (2) > Crucible Clip (2) > Make: US, Europe, Japan > Installation and operational training and any necessary items				
	Equipment with similar or better specs will be considered				
	Maker: US, Europe, Japan, China or equivalent				
	Options & Accessories:				
	Compatible standard accessories				
	Warranty with technical support				
	Operating/Maintenance Manual				
	Shipment/ transportation				
	Grand Total				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local)	Total Price US$/€/¥ etc.
				Add 17% as GST if local made item	
1	**Data LoggersFor measurement of Temperature, humidity, flow rate and other parameters (3units)**				
	General Specifications 20 to 30 measuring channels 4 to 8 MB SRAM for data storage and optional removable microSD for up to 30 GB, 10 to 20 MB flash for program Temperature measuring range -200°C to 1000°C Operating environment -30°C to 70°C and 80% to 95% Humidity level 10/100 Ethernet RJ-45 for LAN connection and CS I/O port for connection Data Transmission protocols RS-232/RS-485; RJ45 Measure virtually any sensor, including voltage, resistive bridge, static vibrating wire, pulse, switch closure etc Compatible with SDMs, multiplexers, terminal input modules, and relays. RS-232 to Datalogger Control Port Cables Maker:US,Canada,Europe,Japan or quivalent Equipment should be provided with warrenty				
2	**Portable Data LoggersFor measurement of Temperature and humidity and other parameters (3units)** **General Specifications:** 6 to 12 Channel temperature datalogers (portable) Simultaneously displays all channel or atleast dispalys 4 to 5 channels Internal storage capactity along with the SD cards programmable sampling rate from 1 to 3600 seconds Accessories Bead Wire Type K Temperature Probe (-40 to 482°F) with connector cable length should be atleast 3 meters. 5 to 10 measuring probes Maker:US,Canada,Europe,Japan or quivalent Equipment should be provided with warrenty				
3	**Temperature Probes**				
	General Specifications:				
3a	**Type K Surface Temperature Probe (-40 to 250°C)** (10 units) Compatible with different data loggers 2m to 3m cable length Compatible with different data loggers				
3b	**Type K Bead Probe (200 units)** Measurement range: -40 °C to 400 °C along with Maximum Temperature of Insulation (length of the teflon wire 5m to 10 m) Compatible with different data loggers				
3c	**Type K Tapered Temperature Probe** (5units) Type-K thermocouple with tapered tip for use in air, non-caustic gas and surface applications. Measurement range:-40 to 800ºC Compatible with different data loggers				

3d	**Type K General Purpose Probe** (50 units) For general purpose applications Type-K thermocouple surface, air and non-caustic gases Measurement range:-40°C to 800 °C 5 to 10 inch Stainless Steel Probe Compatible with different data loggers				
3e	**Immersion Temperature Probe for use in liquids and gels** (10 units) Measurement range: -40 to 1000°C 5 to 10 inch Stainless Steel Probe Cable Length 3 to 10 m Compatible with different data loggers				
3f	**Pipe Clamp Temperature Probe** (2 units) Type-K thermocouple for fast temperature and superheat measurements of pipe surfaces For pipe diameters: 32 mm to 64 mm Measurement range: -40 to 800°C Compatible with different data loggers				
3g	**High Temperature IR Thermometer** (2 units) Measure precise temperatures of up to 1500 °C from a safe distance				

3h	**Thermocouple Calibrator** (1 units) 10 to 15 Inserts Available Maximum Temperature of 430°C/806°F An Independent Over-Temperature Cutout Temperature Sensor Burnout Protection				
4	**Thermal Imager** (1 units) Temperature measurement range-20 °C to +1200 °C Temperature measurement accuracy ± 2 °C or 2 % (at 25 °C nominal) Image capture frequency 9 Hz refresh rate or 60 Hz refresh rate depending upon model variation Detector type Focal Plane Array, uncooled microbolometer, 320 x 240 pixels Thermal sensitivity (NETD) ≤ 0.05 °C at 30 °C target temp (50 mK) Total pixels 76,800 Infrared spectral band 7.5 µm to 14 µm (long wave) Visual (visible light) camera Industrial performance 5.0 megapixel Field of view 24 ° x 17 ° Spatial resolution (IFOV) 1.31 mRad Minimum focus distance 15 cm (approx. 6 in) Field of view 12 ° x 9 ° Spatial resolution (IFOV) 0.65 mRad Maker:US,Canada,Europe,Japan or quivalent Equipment should be provided with warrenty				
5	**Air velocity measuring probes** **General Specifications:** **Hot Wire CFM/CMM Thermo-Anemometer along with data logger** Read Air Velocity and Temperature on dual display Calculates CMM / CFM based on adjustable duct shape and size Slim sensor (8mm) fits easily in 3/8" holes Telescoping probe extends to 7ft Adjustable parameters for Altitude and GAIN Save and view 50 to 100 readings on display Min / Max / Average, Data hold and Auto Power Off Temperature range 0oC to 120oC Complete with telescoping probe with cable, 100V-240V AC Universal Adaptor with plugs, batteries, and hard carrying case				
	Equipment with similar or better specs will be considered				
6	**Sunshine Duration Sensor (1 units)** **General Specifications:** Spectral range 400 to 1100 nm Operational temperature range -40 to +70 °C Sunshine signal 1 ±0.1 V (direct radiation > 120 W/m²) Accuracy > 90% (monthly sunshine hours) Accuracy > 90% (direct signal for clear sky) Analogue output signal 1 mV/Wm² Non-stability (change/year) < 2 % Temperature response < 0.1 %/ºC Response time < 1 m s Power supply 12 VDC Maker:US,Canada,Europe,Japan or quivalent Equipment should be provided with warrenty				
	Equipment with similar or better specs will be considered				

	Equipment should be supplied with experimental, operating and maintenance manual. Training, instalation and commissioning of the equipment will be included in the price				

7	**Pyranometer along with digital data logger (1 units)** Spectral range 285 to 2800 nm Response time (63%) < 0.7 s Response time (95%) < 2 s Zero offset A < 7 W/m² Zero offset B < 2 W/m² Directional error (up to 80° with 1000 W/m² beam) < 10 W/m² Temperature dependence of sensitivity (-20 ºC to +50 ºC) < 1 % Analogue output (-V version) 0 to 1 V Analogue output (-A version) 4 to 20 mA Digital output 2-wire RS-485 **Accessories** Shadow Ring, Mounting brackets and mounting fixture Maker:US,Canada,Europe,Japan or quivalent Equipment should be provided with warrenty Equipment should be supplied with experimental, operating and maintenance manual. Training, instalation and commissioning of the equipment will be included in the price Equipment with similar or better specs will be considered				
8	**Pyrheliometer along with digital data logger (1 units)** pectral range 200 to 4000 nm Response time (63%) < 0.7 s Response time (95%) < 2 s Zero offset due to temperature change (5K/h) < 1 W/m² Temperature dependence of sensitivity (-30 ºC to +60 ºC) < 0.5 % Analogue output (-V version) 0 to 1 V Analogue output (-A version) 4 to 20 mA Digital output 2-wire RS-485 Maker:US,Canada,Europe,Japan or quivalent Equipment should be provided with atleast 3 to 4 years of warrenty Equipment should be supplied with experimental, operating and maintenance manual. Training, instalation and commissioning of the equipment will be included in the price				
9	**PYRGEOMETER** (1 units) Spectral range 4500 to 42000 nm Sensitivity 5 to 15 µV/W/m² Response time < 18 s Window heating offset < 15 W/m² Zero offset B < 4 W/m² Temperature dependence of sensitivity (-10 ºC to +40 ºC) < 5 % Operational temperature range -40 to +80 °C Net irradiance range -250 to +250 W/m² Field of view 170 ° Maker:US,Canada,Europe,Japan or quivalent Equipment should be provided with warrenty Equipment with similar or better specs will be considered Equipment should be supplied with experimental, operating and maintenance manual. Training, instalation and commissioning of the equipment will be included in the price				

10	**Albedometer** (1 units) Spectral range 285 to 2800 nm Sensitivity 7 to 14 µV/W/m² Response time < 5 s Zero offset A < 7 W/m² Zero offset B < 2 W/m² Directional error (up to 80° with 1000 W/m² beam) < 10 W/m² Temperature dependence of sensitivity (-10 ºC to +40 ºC) < 1 % Operational temperature range -40 to +80 °C Maximum solar irradiance 4000 W/m² Field of view 180 ° Maker:US,Canada,Europe,Japan or quivalent Equipment should be provided with atleast 3 to 4 years of warrenty Equipment with similar or better specs will be considered Equipment with similar or better specs will be considered Equipment should be supplied with experimental, operating and maintenance manual. Training, instalation and commissioning of the equipment will be included in the price				
11	**Portable Emissometer (1 units)** Directional Hemispherical Reflectance Total reflectance, Diffuse Reflectance, and Specular Reflectance at 20° (8 measurements simultaneously) Seven bands in the 330 to 2500 nm spectral range 20° from normal incidence Any surface; convex 6" radius; concave 12" radius Operating 0 to 40°C, Maker:US,Canada,Europe,Japan or quivalent Equipment should be provided with warrenty Equipment should be supplied with experimental, operating and maintenance manual. Training, instalation and commissioning of the equipment will be included in the price Equipment with similar or better specs will be considered				
12	**Thickness measuring Meter (2 units)** Measurement range 2.5mm to 200.0mm Range for steel tubes minimum thickness of 3mm x 20mm in diameter Measureable materials iron, steel, plastic, glass, gold and other homogeneous materials probe diamter 12mm Resolution 0.1mm Calibration integrated 3.0 mm steel plate Accuracy ±0.1mm Probe surface temperature standard -10 to 400°C Operating conditions 0 to 40°C / 20 to 90% r.h. Maker:US,Canada,Europe,Japan or quivalent Equipment should be provided withwarrenty Equipment should be provided with warrenty Equipment should be supplied with experimental, operating and maintenance manual. Training, instalation and commissioning of the equipment will be included in the price				
13	General Purpose Tool kit (2 units)				
14	**Glass wool Insulation (1 units)** Temperature resistance upto 200oC 1.5 m x 20m Density: 20 m3 to 50 m^3 Equipment with similar or better specs will be considered				

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local)	Total Price US$/€/¥ etc.
				Add 17% as GST if local made item	
1	**Solar water heating Experimental / Research Unit (Flat Plate and vaccum tube) (1 units)**				
	Thermal solar panel. Tank. Solar simulator. Lamps. Pumping system. Temperature sensors. Flow sensor. Valves set to work in thermosiphon mode or pumping mode. **Heat Generating Unit With Tracking System** Flat Palte Glazed solar thermal collector made of polycarbonate, copper or Aluminium with with polypropylene or copper pipes.and/or Vaccum tube collector. Glazing Surface Toughen Glass. Tracking System. Solar spectrum lamps of 3kW to 4.0 kW to work as the solar simulator. Lamps intensity control from the computer or manually. Computer/manual controlled pump, flow: 0-2 l./min including Flowmeter and Flow sensor **Storage Unit** Storgae Tank with and withouth heat exchanger of capacity 30 to 50 ltrs. Control/ Instrumentation Unit Temperature Meters With Sensors Flow Meter With Sensor Flow Regulator Pipe And Fitting etc Real-Time SCADA for thecontrol of the whole experimental unit Accessories: Radiation meter, Anemometer, Manual etc System should be supplied with experimental, operating and maintenance manual. Training, instalation and commissioning of the equipment will be included in the price Equipment should be provided with warrenty Maker: US; Europe, Japan or equavalent				
2	**Solar Heat Source Stirling engine Research Unit**				
	Stirling motor: hot and cold cylinders made of stainless steel and pistons made of bronze. Device to control the flame of the heating element, to cover it and to release it. Alcohol lamp as heating element along with solar thermal collector as separte heating system. Solar thermal collector may be flat plat or parabolic trough based. Electrical generator with a pulley for converting the generated mechanical energy into electrical energy. Equipped with an electrical load and current and voltage measurement system. Temperature sensors, one in the hot cylinder and the other in the cold cylinder. Pressure sensors, one in the hot cylinder and the other in the cold cylinder, range: 0 - 1.5 PSI.Overtemperature protection with the activation of the device to control the flame. Real-Time SCADA systme for the control of experimental set up System should be supplied with experimental, operating and maintenance manual. Training, instalation and commissioning of the equipment will be included in the price Equipment should be provided with warrenty Maker: US; Europe, Japan or equavalent				
3	**Solar Heat Source Vapour Turbine Research Unit (1 units)** • **Vapour Generator:** Copper generating coil in water filled stainless steel tank fitted with thermostatically controlled with 1.0 to 3.0 kW heater. • **Turbine:** Single stage impulse turbine - power output approximately 20 W to 50 Watt at 20,000rev per minute. • **Condenser:** Water cooled coil housed • **Feedpump:** Single acting plunger pump driven by 12V D.C motor supplied from transformer and rectifier. • **Accumulator:** To smooth flow and split excess R141b to condenser. • **Circulating Pump:** To circulate water through vapour generator tank				

	and solar pane. flat plate solar collectors fo rthe heat source • **Safety :** Turbine should be enclosed in strong guard ring. High pressure cut-out and safety valve for condenser. All components earthed (grounded). Unit should also be protected by circuit breaker and current circuit breaker. **System should be supplied with :** One experimental, operating and maintenance manual. Suitable water cooler. System should be supplied with experimental, operating and maintenance manual. Training, instalation and commissioning of the equipment will be included in the price Equipment should be provided withwarrenty Maker: US; Europe, Japan or equavalent				
4	**STEADY STATE SOLAR SIMULATOR FOR SOLAR THERMAL COLLECTORS along with the out door tracker (1 units)** To test and develop solar thermal collectors independent of weather and season Test stand, area specifications Standard test area 3.5 m × 2.5 m (approximately) Setting angle, test area 0 to 90 degrees Setting angle, lamp field 0 to 90 degrees Flexibly and precisely positioned lamps to illuminate the different areas of the Test bench at different areas and optimum homogeneities Lamp specifications Number of lamps " variable (10 to 15) Metal halide with maximum intensity of 1000 t0 1200 W/m2. the dimming capacity of the lamps should be 50% to 100% Standard boundary conditions: Mass fl ow 100 – 600 kg h-1 Temperature 0 – 100° C Wind speed on test area 2 – 4 m s-1 Relevant standards: EN 12975, ISO 9806-1 **Out door Tracking unit** Simultaneous testing capacity 2 to 4 collector Tracking Elevation axis 0° to 90° Azimuth axis 270° 340° Tracking precision ± 0,5° to ±0.1° in both axes Standard boundary conditions Mass fl ow 100 – 600 kg h-1 Temperature 0 – 110° C Relevant standards: EN 12975, ISO 9806-1 System should be supplied with experimental, operating and maintenance manual. Training, instalation and commissioning of the equipment will be included in the price Equipment should be provided with warrenty Maker: US; Europe, Japan or equavalent				
5	**HAIL IMPACT TEST STAND for Solar Thermal and PV collectors (1 units)** Standard test area 3.0 to 6.0 m2 Simultaneous testing capacity 1 to 2 collector Hail stones Standard diameters 10 to 45 mm Velocity of ice balls 10 – 40 m s-1 Relevant standards IEC 61215, IEC 61646, EN 12975-2, ISO 9806-2 System should be supplied with experimental, operating and maintenance manual. Training, instalation and commissioning of the equipment will be included in the price Equipment should be provided with warrenty Maker: US; Europe, Japan or equavalent				
6	**Geothermal low energy Research Unit (1 units)** Geothermal Heat Pump Cooling Capacity and heating capacity upto 2.0 KW to 4.0 KW with evironmnetal friendly refrigerant				

	Ground-Loop Heat Exchanger" 2 short loops, 1 long loop Water Tank Capacity: 120 to 150 ltrs along with the expansion tank of capacity 2.0 to 4.0 ltrs. Centrifugal pumping system. Chilling unit to maintain constant temperature into the water bath Temperature sensors for the refrigerant circuit. 2 Temperature sensors for the air temperature.Temperature sensors for the water temperature.Manometers for the refrigerant circuit.Refrigerant flow meter. Anemometer. AC/DC Clamp-on Meter. Low and high pressure gauges for the monitring of the refrigerant Safety Devices: High-pressure control, frost sensor, relief valve, fuse, breaker, pullout disconnect switch, tag and padlock System should be supplied with experimental, operating and maintenance manual. Training, instalation and commissioning of the equipment will be included in the price Equipment should be provided with atleast 1 to 3 years of warrenty Maker: US; Europe, Japan or equavalent				

Equipment with similar or better specs will be considered

7	**Integrated renewable energy systems (solar and wind power with energy storage in batteries or through the generation of hydrogen powering a fuel cell.): generation, storage and management of energy. (1 units)** Integrated renewable energy systems (solar and wind power with energy storage in batteries or through the generation of hydrogen powering a fuel cell.): generation, storage and management of energy. Enrgy management unit to enable the quick modification of the system's setup, making it possible to combine multiple renewable inputs with different energy storage options. Designed to run in different setups allowing to examine electrical paths of different energy sources and their behaviour on a component level or within the overall energy system. Introduction to solar, wind, hydrogen and fuel cell technology Dimensioning of hybrid systems Energy Management and operation of hybrid systems Autonomous operation of real loads Scenario observation: night-time operation, periods of no wind, peak loads Photovoltaic System: 480W Wind Generator System: 400W Wind turbine 3-Blades, cut-in wind speed 3m/s; Pmax at 12.5m/s integrated charge controller; maintenance free generator housing Fuel Cell System: 1200 W Efficiency up to 50% Air cooled system (335m³/h @ 30°C), PEM technology. Hydrogen consumption 15 sl/min @1200W DC/DC Converter: Prated = 1200W Hydrogen Generation and Storage Hydrogen generator with I/O-Board: 60Nl/h high purity 99.999% Metal hydride canister (MHS760): 500Nl @ 10bar including safety valves Gas detection device with sensor connected to emergency shutdown system Energy management unit: 3500 W Extension “Grid connection” Battery Banks : attery Banks Battery Bank (lead-acid technology) - EM Mode - Full System: 55Ah, 48Vdc, capacity 2.640Wh Battery Bank (lead-acid technology) - CT Mode - Component : 18Ah, 48Vdc, capacity 864Wh Electronic load (integrated and programmable) Pmax = 2400W Customer software: Software based on Lab View Outdoor Sensors and Measurement Techniques Temperature sensor PV module Temperature sensor ambient Solar radiation sensor (global radiation) Wind speed sensor Extra sensor input channels up to 10 to 20 Interface Unit (Visualization, Data capturing) analog display for Public Grid voltage analog display for Island Grid voltage analog display for Battery Bank voltage analog display for Battery Bank current analog manometer for hydrogen pressure Computer 64 bit for the display of data System should be supplied with experimental, operating and maintenance manual. Training, instalation and commissioning of the equipment will be included in the price Equipment should be provided withwarrenty Maker: US; Europe, Japan or equavalent				

Equipment with similar or better specs will be considered

8	**Dessicant Dehumidification Wheel (1 units)** Material: high performance Silica Gel (WSG) Wheel Dia 6 to 10 inches Processed Air volume: 70 to 100 CFM Rotor depth 100 to 150 mm Separtes ductable ports for the prcess air and regenration inlet and outlet Cassettes: galvanized steel construction with removable side panels Equipment with similar or better specs will be considered				
9	**Solar Thermal Desalination Unit (1 units)** Solar Thermal trough/flat plate based unit 10 to 20 m^3 of pure water production Equipment with similar or better specs will be considered				
10	**Solar Air dryer Lab unit (1 units)** Drying of vegitables and fruits The hot air temperature obtained from the solar collector should vary from 70°C to 100°C and above. Hybrid with electric heating system Equipment with similar or better specs will be considered				

S. No	Description	**County of Origin**	**Unit Price US$/€/¥**	**Purchase (CIF/Local)**	**Total Price US$/€/¥ etc.**
				Add 17% as GST if local made item	
1	**Three-Phase Power Quality and Energy Analyzer (2 units)** General Specifications: Power inverter efficiency Power Wave data capture Wave form capture Automatic Transient Mode Fully Class-A compliant Mains signaling Troubleshoot real-time Highest safety rating in the industry Measure all three phases and neutral Automatic Trending System-Monitor Logger function View graphs and generate reports Twelve hours operating time per charge on Li-ion battery pack voltage waveforms, current waveforms, Vrms, Vfund. Arms, A fund, V @ cursor, A @ cursor, phase angles. Vrms phase to phase, Vrms phase to neutral, Vpeak, V Crest Factor, Arms Apeak, A Crest Factor, Hz Harmonics dc, 1 to 50, up to 9th harmonic for 400 Hz. Harmonics Volts, THD, Harmonic Amps, K factor Amps, Harmonic Watts, THd Watts, K factor Watts, Interharmonic Volts, Interharmonic Amps, Vrms, Arms (relative to fundamental or to total rms). Vrms, Arms, Wfull, Wfund., VAfull, VAfund., VAharmonics, VAunbalance, var, PF, DPF, CosQ, Efficiency factor, Wforward, Wreverse. Wfund, VAharmonics, VAunbalance, var, A, Loss Active, Loss Reactive, Loss Harmonics, Loss Unbalance, Loss Neutral, Loss Cost (based upon user defined cost / kWh). Measure all three phases and neutral: With included four System should be supplied with experimental, operating and maintenance manual. Training, instalation and commissioning of the equipment will be included in the price Equipment should be provided with warrenty Maker: US; Europe, Japan or equavalent				
2	**True-rms AC Clamp Meter (6 units)** 1000 A AC and DC current measurement with fixed jaw 2500 A AC current measurement with iFlex flexible current probe 1000 V AC and DC voltage measurement True-rms ac voltage and current for accurate measurements on non-linear signals Frequency measurement to 500 Hz with both jaw and iFlex 60 kΩ resistance measurement with continuity detection				

	Min, max, average and inrush recording to capture variations automatically 500 mV dc measurement range to interface with other accessories 1000 µF capacitance measurement iFlex flexible current probe expands the measurement range to 2500 A ac while providing increased display flexibility, ability to measure awkward sized conductors and improved wire access CAT IV 600 V, CAT III 1000 V safety rating System should be supplied with experimental, operating and maintenance manual. Training, instalation and commissioning of the equipment will be included in the price Equipment should be provided with warrenty Maker: US; Europe, Japan or equavalent				
3	**HVAC Clamp Meters (2 units)** Specially for HVAC applications with capacitance, DC Current (µA), and temperature measurements Measure start and run motor capacitors Measure supply side current and voltage as well as load side current and voltage Measure current and voltage phase balance on 3 phase systems Troubleshoot compressor electrical motor faults System should be supplied with experimental, operating and maintenance manual. Training, instalation and commissioning of the equipment will be included in the price Equipment should be provided with warrenty Maker: US; Europe, Japan or equavalent				
4	**Milliamp Process Clamp Meter (6 units)** Current Range: 0.1 to 100A DC or 0.1 to 70A AC Output Signal: 10A range: 100mV/A | 100A range: 10mV/A System should be supplied with experimental, operating and maintenance manual. Training, instalation and commissioning of the equipment will be included in the price Equipment should be provided with warrenty Maker: US; Europe, Japan or equavalent				
5	**Thermal Imaging Scanner for Building Diagnostics (1 units)** Measurement range: -20°C to +200°C Measurement accuracy: ± 5°C or 5 % (at 25°C nominal, whichever is greater) Thermal sensitivity : ≤ 0.1°C at 30°C target temp. (100 mK) Standard infrared lens type: Field of view: 17° x 17° Spatial resolution: (IFOV) 2.50 mRad Minimum focus distance: 15 cm (approx. 6 in) Infrared spectral band: 7.5 µm to 14 µm (long wave) Storage medium: SD Memory Card (2 GB memory card will store at least 1200 fully radiometric (.is2) IR images annotations, or 3000 basic bitmap (.bmp) images, transferrable to PC via included multi-format USB card reader Operating temperature -10°C to +50°C (14°F to 122°F) and 10 % to 95 % non-condensing RH System should be supplied with experimental, operating and maintenance manual. Training, instalation and commissioning of the equipment will be included in the price Equipment should be provided with warrenty Maker: US; Europe, Japan or equavalent				

6	**Ultrasonic Flow Meter (2 units)** velocity assessments in closed piping systems of 1/4" (6 mm) and higher operates on metal or plastic pipes containing liquids with greater than 100 ppm of 100 micron size suspended solids or entrained gases measures fluid velocities from 0.3 to 30.0 FPS (0.10 to 9.00 MPS) with a 100:1 turndown ratio. provides accurate flow readings on applications such as dredging systems, crude oil, sludges, and waste slurries System should be supplied with experimental, operating and maintenance manual. Training, instalation and commissioning of the equipment will be included in the price Equipment should be provided with warrenty Maker: US; Europe, Japan or equavalent				
7	**Hot Wire Anemometer along with data logger** (2 units) Read Air Velocity and Temperature on dual display Calculates CMM / CFM based on adjustable duct shape and size Slim sensor (8mm) fits easily in 3/8" holes Telescoping probe extends to 7ft Adjustable parameters for Altitude and GAIN Save and view 50 to 100 readings on display Min / Max / Average, Data hold and Auto Power Off Temperature range 0oC to 120oC Complete with telescoping probe with cable, 100V-240V AC Universal Adaptor with plugs, batteries, and hard carrying case				

	System should be supplied with experimental, operating and maintenance manual. Training, instalation and commissioning of the equipment will be included in the price Equipment should be provided with atleast 3 to 4 years of warrenty Maker: US; Europe, Japan or equavalent				
8	**Lux meters (5 units)** range to 10,000Fc or 100kLux Record/Recall MIN, MAX, Data Hold and Auto power off				
9	**Indoor Air Quality meter (2 units)** Measures CO2, CO, O2, humidity and temperature Real time data logger with optional 2GB SD memory card				
10	**Sound Meter (2 units)** Low: 35 to 100dB High: 65 to 130dB Accuracy ± 1.5dB				
11	**Leak Detector with Transmitter (2 units)** Tests the "air-tightness" of weather seals, tanks, ovens, refrigerators, etc. Detects any pressurized gas leak regardless of type CFC's, HFC's, Nitrogen, etc				
12	**Vibration Meter (1 units)** Low frequency range: 10 Hz to 1,000 Hz High frequency range: 4,000 Hz to 20,000 Hz Vibration limit: 50 g peak (100 g peak-peak) Signal to noise ratio: 80 db Sensitivity: 100 mV / g ± 10% Measurement range:0.01 g to 50 g Operating temperature: -20°C to 50°C (-4°F to 122°F)				
13	**Combustion Analyzer (1 units)** **For Residential & Commercial Applications** O2, CO, CO2, Ambient/room CO, CO Air free CO sensors with NOx filter Flue Draft, Pressure (vent or duct or switches) Temperature (flue & room) Combustion Efficiency, Excess air Flue Gas Matrix (w/ four user-defined combustion types) Oil flow and gas clock BTU calculator Memory to 500 readings plus customer site information Probes for: Fine pressure, Gas Leak, Ambient CO2 (IR), Ambient CO in air,				
14	**Battery Capacity Tester (1 units)** Battery resistance:3 mΩ to 3000 mΩ Resolution:0.001 mΩ to 1 mΩ Vdc: 6 V to 1000 V				

Maker:US,Canada,Europe,Japan or quivalent
Equipment should be provided with warrenty

Equipment should be supplied with experimental, operating and maintenance manual.
Training, instalation and commissioning of the equipment will be included in the price

S. No	Description	County of Origin	Unit Price US$/€/¥	Purchase (CIF/Local)
				Add 17% as GST if local made item
1	**Design Builder (1 units)** License Type: v4 perpetual license/ Educational licences Quantity: 2 licences The software package should include Energy Assessor Plus and Architectural Plus Package The software should be delivered in the running conditions for the given licences on the provided machines. The software should be delivered in the running conditions for all three licences. Software Maintenance Agreement shouls be included in thegiven price for atlest 3 years The software package should also include any update if available.In case of any query the supplier should handle this Training and Technical Support should be included in the software package also Software should be provided with warrenty			
2	**ASAP PRO: optical analysis software and APEX (1 units)** License Type: Network Perpetual The software should be delivered in the running conditions for the given licences on the provided machines Software should include all the available libraries including Add ons. **Software Maintenance Support:** maintenance and technical Support should be provided. Free updates will be provided if any. Technical Support should be offered through telephone, e-mail, and Web assistance provided by specialized support engineers. Training and Technical Support should be included in the software package also Software should be provided with warrenty			

3	**Homer Software (1 units)** Licence Type: Academic Concurrent-user Permanent License The software should be delivered in the running conditions for the given licences on the provided machines Software should include all the available libraries including Add ons. **Software Maintenance Support:** maintenance and technical Support should be provided. Free updates will be provided if any. Technical Support should be offered through telephone, e-mail, and Web assistance provided by specialized support engineers. Software Maintenance Agreement shouls be included in thegiven price for atlest 3 years Training and Technical Support should be included in the software package also Software should be provided with warrenty			
4	**PV*SOL premium; T*SOL; GeoT*SOL; Solar Site Selector with MCS-aid foil; kesa-aladin Light (1 units)** Licence Type: Academic Concurrent-user Permanent License at least for 40 computers The software should be delivered in the running conditions for the given licences on the provided machines Software should include all the available libraries including Add ons. **Software Maintenance Support:** maintenance and technical Support should be provided. Free updates will be provided if any. Technical Support should be offered through telephone, e-mail, and Web assistance provided by specialized support engineers. Software Maintenance Agreement shouls be included in the given price for atlest 3 years Training and Technical Support should be included in the software package also Software should be provided with warrenty			

5	**Meteonorm 7 Full Version (1 units)** Licence Type: 2.0 Permanent License The software should be delivered in the running conditions for the given licences on the provided machines Software should include all the available libraries including Add ons. **Software Maintenance Support:** maintenance and technical Support should be provided. Free updates will be provided if any. Technical Support should be offered through telephone, e-mail, and Web assistance provided by specialized support engineers. Software Maintenance Agreement shouls be included in the given price for atlest 3 years Training and Technical Support should be included in the software package also Software should be provided with warrenty			

MACHINES / TOOLS / EQUIPMENTS (MACHINE SHOP)

Annex J

`- AllMachines/Tools/Equipments **Warranty** : 2-5 Years

Equipment with similar or better specs will be considered

`- All Operational Machines/Equipments supported with Functional Training Programe

`- All Operational Machines/Equipments supported with Installation & Functional Test

S. No	Description	Country of Origin	Unit Price (US$)	Purchase (CIF/Local) pl include 17% in case of local (US$)	Total Price (US$)
1	**01 x Multi Functional Lathe, Mill & Drill Machine with complete Standardard accessories**	**China , Local, Korean**			
	General Specifications				
	Cutting (lathe):				
	1) Swing over bed: 280mm				
	2) Distance between centers:600/750mm				
	3) Spindle taper:MT4				
	5) Spindle speed : 125-2000rpm				
	6) Compound travel: 80mm				
	7) Cross slide travel: 155mm				
	8) Motor output power 750w				
	9) Range of threads:				
	a) Metric: 0.25 ~ 3.0 mm (14 thread pitches)				
	b) Imperial: 12~96TPI (9 thread pitches)				
	Drilling and Milling :				
	1) Drilling capacity: 25mm				
	2) Spindle taper: MT3 or R8				
	3) Spindle speed:				
	Low range: 100 - 1000rpm				
	High range: 100-2000 rpm				
	4) Headstock travel: 300mm				
	5) Motor output power: 600W				
	Standard attachment				
	3-jaw chuck & 4-jaws chuck Dead center, Oil can, Changer gear set, Wrench set				

2	**01 x Plate Shearing/Bending/Rolling Machine (3-in-1) with complete Standardard accessories**	**China , Local, Korean**			
	General Specifications				
	Processing Range 200mm-1320mm				
	Bed width : 1320mm				
	Max. shearing thickness: 1.5mm				
	Max. handing thickness: 1.5				
	Max. bending angle : 90˚				
	Max. rolling thickness : 1.5				
	Min. rolling dia : 76mm				
	Standard attachment				
	Standard, Oil can, Changer gear set, Wrench set				
3	**01 x Bench-top Radial Drill Press with complete Standardard accessories**	**Local, China, Korean**			
	General Specifications				
	Processing Range 1mm-25mm				
	Motor: 1 HP				
	•Overall height : 31-1/2-Inch 160-Inch				
	Drill chuck: 1/64-Inch-1-Inch •				
	Standard attachment				
	Standard, Oil can, Changer gear set, Wrench set				
	Installation and operational training				
4	**01 x Manual Utility Hydraulic Bench Press with complete Standardard accessories**	**China, USA, UK**			
	General Specifications				
	Load capacity : 10 tons				
	Overall Height : 36 inches				
	Overall Length : 23 inches				
	Overall Width : l8 inches				
	Table dimensions : 23" Length x 18" Width x 36" Height				
	Standard attachment				
	Stand, Oil can, Changer gear set, Wrench set				
5	**01 x Table Saw with complete Standardard accessories**	**China , Local, UK, USA**			
	General Specifications				

	Dust Collection Port : 2.5"	**USA**			
	Number of Outlets : 1				
	Table Size (Length) : 20"				
	Table Size (Width) : 25.25"				
	Table Saw Working Table : 40" x 25-1/4"				
	Table Saw Blade Diameter : 10"				
	Table Saw RPM : 4000				
	Table Saw Arbor : 5/8"				
	Table Saw Cutting Height @ 90° : 3-1/8"				
	Table Saw Cutting Height @ 45° : 2-1/8"				
	Maximum Dado Diameter : 8"				
	Maximum Dado Width : 13/16"				
	Maximum Rip Cut (Right) : 30"				
	Power : 220V Single Phase				
	Length : 45"				
	Width : 27"				
	Height : 37"				
	Standard attachment : Keys, Wrench Set, Oil Cane				
6	**01 x Bench Type Hand Plate Shear/Cutter with complete Standardard accessories**	**China , Local, UK, USA**			
	General Specifications				
	- Blade Length: 12"				
	- Rod Capacity: 1/2"				
	- Maximum Cut Thickness: 1/4"				
	- Maximum Length of Single Cut: 11 1/2"				
	- Maximum Thickness at Full Length Of Cut: 3/16" (7 gauge)				
	- Maximum Cut Flat Steel: 2 3/4" x 1/4"				
	- Shear Blades made of precision ground hardened steel				
	- Suitable for shearing carbon steel plate				
	- Designed to cut sheet metal, rebar, and round stock				
	- Adjustable hold-down clamp aids in securing material Spring-loaded Handle				
	- Handle length: 32"				
	- Mounts directly to a workbench				
	- Heavy duty structure				

	- Foot Print with out Handle: 3.5" x 12.5" x 18"				
	Standard attachment : Base Plate Form				
7	**01 x Manual Press with complete Standardard accessories**	**China , Local, UK, USA**			
	General Specifications				
	- Height : 12”				
	- Width : 6”				
	- Length : 12”				
	- Center Screw Dia : 12” (ACME Threaded)				
	Standard attachment : Stand, Wrench set				
8	**01 x Bench Tool Grinder with complete Standardard accessories**	**Local, China , Korean**			
	General Specifications				
	- Diameter : 6"				
	- Horsepower (hp) : 1				
	- Maximum speed (rpm) : 3450				
	- Product Height : 10-1/2 "				
	- Product Length : 14"				
	- Product Width : 14"				
	Standard attachment : Stand, Wrench set				
9	**Impact Drill Machine with complete Standardard accessories**	**Local, China, Korean**			
	General Specifications				
	Capacity : 220/23 OV~50/60 Hz				
	Operating power : 1050 W				
	Idle rotation speed no : 0-1000/min-1				
	Geared-rim drill chuck -Capacity : 1.5 - 13 mm				
	Standard attachment : Keys, Box				
10	**Manual Hand Drill**	**Local, China, Korean**			
	General Specifications				
	- Drilling Capacity : 10mm				
	- Length : 300mm				
	- Width : 80mm				
	Standard attachment : Keys, Box				

11	**01 Set of Lathe Accy (as well Multi Functional Lathe)**	**China , Local, Korean**			
12	**01 Set of Lathe Tool Set (HSS) 0.5``x 5`` ~ 0.25``x5``**	**USA, UK**			
13	**01 Set of Lathe Tool Set (Diamond Bit) 0.5``x 5`` ~ 0.25``x5``**	**USA, UK**			
14	**01 Set of End Mill Cutters Set (HSS) 1mm ~ 25mm**	**USA, UK**			
15	**01 Set of End Mill Cutters Set (Diamond Bit) 1mm ~ 25mm**	**USA, UK**			
16	**01 Set of Drill Bit Set 1mm ~ 25mm**	**USA, UK**			
17	**01 Set of Drill Bit Set 3/16`` ~ 1``**	**USA, UK**			
18	**01 x Manual Pipe Bender 0.25`` ~ 2``**	**Local, China, Korean**			
	General Specifications				
	- Bend Range : 10mm -25mm				
	- Configuration Die (mm) : 10,12,1416,19,22,25				
	- Pipe wall thickness (mm) : 0.8-2.0				
	- Volume (cm) : 65 × 20 × 16				
	Standard attachment : Stand, Wrenches set				
19	**01 x Portable Disk Grinder**	**Local, China, Korean**			
	General Specifications				
	Operating power : 230V~50 Hz				
	Capacity : 700/780W				
	Idle rotation speed : 11,500/min				
	Grinding discs-O : 100/115/125 mm				
	Perimeter speed : 80m/s				
	Grinding spindle thread : M10/M14				
	Standard attachment : Keys, Wrenches Set				
20	**01 x Metal Cut Off Saw**	**Local, China, UK**			
	General Specifications				
	- Motor Power : 2200 W				
	- Diameter Blade : 355mm (25.4mm Bore)				
	- No Load Speed : 3800 rpm				
	- Maximum Depth of Cut : 120mm				
	Standard attachment : Keys, Wrenches Set				

21	**01 x Arc Welding Plant with complete Standardard accessories**	**Local, China, Korean**			
	General Specifications				
	- Input Power : 220V (Single Pashas)				
	- Input Voltage Frequency : 50/60 Hz				
	-Output Current range : 20 - 200 A				
	- Demeter of Rod : 1.6 - 4mm				
	- Protection Class : IP23				
	Standard attachment : Holders, Wire Clamps, Wrenches				
22	**01 x Argon Welding Plant with complete Standardard accessories**	**Local, China, Korean**			
	General Specifications				
	- Input Power : 220V (Single Pashas)				
	- Input Voltage Frequency : 50/60 Hz				
	- Output Current Range : 10-200 A				
	- Protection Class : IP23				
	Standard attachment : Holders, Wire Clamps, Wrenches				
23	**04 x Bench Vices**	**Local, China, Korean**			
	General Specifications				
	- Jaws : 4"				
	- Large Anvil : 78x36mm				
	- Opening : 63.5mm				
	- Throat Depth : 51mm				
	Standard attachment : Jaws, Bolts				
24	**02 x Wood working Bench Vice**	**Local, China, Korean**			
	General Specifications				
	- Durable cast iron construction				
	- Bench mounting vice : 6"				
	- Maximum opening : 6"				
	- Length : 9.5"				
	- Width : 6”				
	- Height : 3”				
	- Slotted base for positioning on table				
	- Chrome plated sliding bar				
	Standard attachment : Jaws, Bolts				

25	**02 x Heat Gun 3000w with complete Standardard accessories**	**German, UK, USA**			
	General Specifications				
	- Input Voltage : 220V				
	- Output Power : 3000W				
	- Air Valium : 300 - 500				
	- Temperature Adjustable				
	Standard attachment : Box, Keys, Wrenches Set				
26	**02 x Hand Riveting Gun with complete Standardard accessories**	**Local, China, Korean**			
	General Specifications				
	- Setting capacity : 4.8 / 5.0mm Dia.				
	- Supplied with nosepieces : 2.4mm, 3.2mm, 4.0mm & 4.8mm Dia				
	- Contoured handle grips for comfort.				
	- Rivet-retaining handle				
	Standard attachment : Nosepiece wrench				
27	**01 x Digital Vernier Caliper with complete Standardard accessories**	**Japan, UK, USA, Sweden, German**			
	General Specifications				
	- Range : 0 - 200mm				
	- Reading : mm/inches				
	- Measurement : Outer, Inner, Depth				
	Standard attachment : Box, Gauge, Wrench				
28	**01 x Digital Micrometer with complete Standardard accessories**	**Japan, UK, USA, Sweden, German**			
	General Specifications				
	- Range : 0 - 25mm				
	- Reading : mm/inches				
	- Measurement : Outer				
	Standard attachment : Box, Gauge, Wrench				
29	**01 x Height Gauge with complete Standardard accessories**	**Japan, UK, USA, German**			
	General Specifications				
	- Range : 0 - 300mm				
	- Reading : mm				
	Standard attachment : Box, Gauge, Wrench				

30	**01 x Digital Clamp Meter with iFlex**	**German, Japan, UK, USA**			
	General Specifications				
	- AC Stroom Meten :200A				
	- AC Spanning meten : 600V				
	- DC Stroom Meten :200A				
	- DC Spanning meten : 600V				
	- WeerStandard meten : 6,000 Ω				
	Standard attachment : Bag, iFlex, Probes				
31	**01 x Tool Kit of 63 Pieces Electrical Network Test Maintenance Tools Telecom Kit C9003A**	**German, Japan, UK, USA**			
	General Specifications				
	- Telecommunications group X4 （T5，6，7，8）				
	- Word Rubber and plastic handle screwdriver X3 (3*100MM，3*150MM，4*150MM)				
	- Cross Rubber and plastic handle screwdriver X3 (3*100MM，3*150MM，4*150MM)				
	- Needle-nose pliers X1 (6")				
	- Diagonal pliers X1 (6")				
	- Diagonal pliers X1 (6")				
	- Network pliers X1 (7")				
	- Wire stripping pliers X1				
	- Electrical tape X1 (5Y)				
	- Solder wire X1				
	- Soldering iron X1 (30W)				
	- Soldering iron frame X1				
	- Solder sucker X1				
	- Word Mini screwdriver X3 （1.0,2.4,3.5MM）				
	- Cross Mini screwdriver X3 (1.6,2.0,3.0MM)				
	- Adjustable wrench X1 (6")				
	- Tweezers X1				
	- Digital display test pencil X1 (12-250V)				
	- Batch head handle X1				
	- Digital display type Multimeter X1				
	- Pen knife X1				
	- Zinc alloy rod X1 (60MM)				
	- Tape measure X1 (3M)				

	- 6.3MM Six corner sleeve X10 （4，5，6，7，8，9，10，11，12，13MM）				
	- 6.3MM series 25MM Cross screwdriver head X4 （#0，#1，#2，#3）				
	- 6.3MM series 25MM Six angle screwdriver head X4 （H3，4，5，6）				
	- 6.3MM series 25MM A rotating head X2（3，4MM）				
	- 6.3MM series 25MM Flower type rotating head X7 （T10，15，20，25，27，30，40）				
	- 6.3MM series 25MM M word screwdriver head X3 （PZ1，2，3）				
32	**01 x Tool Kit of 14in1 60W 110V Electric Soldering Set Iron Standard DE soldering Pump**	**German, Japan, UK, USA**			
	General Specifications				
	Soldering Iron				
	1. Model: HH601				
	2. Voltage: 110V				
	3. Power: 60W				
	4. Power Cable Length: 41.33" / 105cm				
	5. Length: 9.44" / 24cm				
	6. Weight: 3.49oz / 99g				
	7. Plug Type: US Standardard				
	8. Color: Blue & Silver				
	9. Material: Metal + Plastic				
	Standard attachment				
	1 x Soldering Iron				
	1 x DE soldering Pump				
	2 x Tweezers				
	1 x Rosin				
	1 x Wire				
	1 x Suction Cup				
	2 x Picks				
	2 x Screwdriver				
	1 x Paddle				
	1 x Base				
	1 x Coil				

33	**01 x Tool Kit of Professional 301 Piece Mechanic's Shop, Garage Vehicle Repair Tools**	**USA, Japan, UK, German**			
	General Specifications				
	- Fully polished chrome ratchet set				
	- Vanadium steel socket				
	- Drive Ratchets				
	- 202 sockets (Inches & millimeter)				
	- 5 extension bars				
	- breaker bar adaptors				
	- universal joint				
	- 10 chrome vanadium combination wrenches				
	- adjustable wrench				
	- 3 chrome vanadium pliers				
	- 16 chrome vanadium screwdrivers				
34	**01 Kit of 10Pc Body Fender Hammer for Dolly Repair Service**	**USA, Japan, UK, German**			
	General Specifications				
	- 3.93" X 11" Hammer				
	- 6.29" X 11" Hammer				
	- 1.37" X 13.77" File				
	- 3.93" X 11.81" Install Hammer				
	- 2" X 3.14" X 2.44" Dolly				
	- 2.20" X 1.77" X 4.72" Dolly				
	- 2.04" X 1.49" X 4.96" Dolly				
	- 2.24" X 2.95" X 5.03" Dolly				
	- 0.78" X 14.56" Bar				
	- High Impact Blow Molded Case Included				
	Standard attachment : - High Impact Blow Molded Case				
35	**01 x Marking and Measuring Kit**	**USA, Japan, UK, German**			
	General Specifications				
	- Dual marking gauge and shaft clamp set (05N70.10)				
	- Compass Gauge (05N36.01) . 7-1/2" long scribe circles up to 12" in diameter.				
	- Indelible pen (25K04.31) (protected by a metal sleeve)				
	- Mechanical pencil (25K04.10) durable 2.8mm				

	- 12" cabinetmaker's rule (60N20.06) and 6" pocket rule (60N47.01) graduated in 8ths, 16ths, 32nds and 64ths.				
	- 4" dial caliper (88N62.01) for inside, outside and depth measurements, graduated in thousandths of an inch.				
	- Ruler stop (05N68.01) provides a solid reference point for quick registration on an edge.				
	- Lee Valley 25' tape measure (06K11.25)				
	Two Lee Valley 10' cabinetmaker's tape measures (06K15.01), also right-to-left reading and graduated in 16ths.				
	- Tape tip (50K58.01) helps you make diagonal measurements with a tape measure.				
	- Miter hook (50N37.01) makes it easy to measure from an inside or outside corner of a miter with a tape measure.				
	- Aluminum sliding bevel gauge (60N20.10) can be set anywhere between 0° and 180°.				
	- Large saddle square (05N56.10) lets you scribe two perpendicular surfaces at a time.				
	- Folding square (01N02.02), with accurate detents at 45°, 90° and 135°, is also useful for miter work.				
	- Precision square (05N35.01) is useful for general layout, in 32nds on the 3" leg and in 16ths on the 6" leg.				
	- Square level (05N43.01) is a versatile level that attaches to a steel square (steel rule, I-beam, etc.) with integral rare-earth magnets. A vertical slot with a clamp holds a ruler (such as the 12" rule in this kit) for measuring depth or rise and run.				
	- Flat-bob (05K97.01) stabilizes rapidly and doesn't roll. The kit includes an extra 8' of cord.				
36	**01 Set of 75PC SAE/METRIC TAP and DIES SET**	**USA, Japan, UK, German**			
	General Specifications				
	- 16 StandardARD TAPS: 4-40, 6-32, 8-32, 10-24, 10-32, 12-24, 1/4-20, 1/4-28, 5/16-18, 5/16-24, 3/8-16, 3/8-24, 7/16-14, 7/16-20, 1/2-13, 1/2-20				
	- 16 StandardARD 1" HEX DIES: 4-40, 6-32, 8-32, 10-24, 10-32, 12-24, 1/4-20, 1/4-28, 5/16-18, 5/16-24, 3/8-16, 3/8-24, 7/16-14, 7/16-20, 1/2-13, 1/2-20				

	- 16 METRIC TAPS: 3MM-.50, 3MM-.60, 4MM-.70, 4MM-.75, 5MM-.80,5MM-.90, 6MM-1.00, 7MM-1.00, 8MM-1.25, 9MM-1.00, 9MM-1.25, 10MM-1.25, 10MM-1.5, 11MM-1.50, 12MM-1.50, 12MM-1.75				
	- 16 METRIC 1" HEX DIES: 3MM-.50, 3MM-.60, 4MM-.70, 4MM-.75, 5MM-.80, 5MM-.90, 6MM-1.00, 7MM-1.00, 8MM-1.25, 9MM-1.00, 9MM-1.25, 10MM-1.25, 10MM-1.5, 11MM-1.50, 12MM-1.50, 12MM-1.75				
	- 1/8-27 PIPE TAP AND DIE				
	- 1/8-28 PIPE TAP AND DIE				
	- 3/32" -1/4" TAP WRENCH				
	- 0"- 1/4" T-HANDLE WRENCH				
	- 1/4" -1/2" T-HANDLE WRENCH				
	- 1" DIE STOCK				
	- StandardARD SCREW PITCH GAUGE				
	- METRIC SCREW PITCH GAUGE				
	- #5 SCREWDRIVER				
37	**06 x Safety Glasses Clear & Smoke**	**China , UK, USA, Korean**			
	General Specifications				
	Made entirely of highly-resistant polycarbonate				
	Anti-fog coating				
	Anti-scratch coating				
38	**04 x Bolle ATOM Safety Goggle and Face Shield Set**	**China , UK, USA, Korean**			
	General Specifications				
	- Thermo Plastic Rubber (TPR)				
	- Overflow chute for liquids				
	- Ball-pivot				
	- Adjustable strap				
	- Fits over prescription glasses				
39	**04 Pkt x Safety Gloves**	**China , Local, UK, USA, Korean**			
	General Specifications				
	- Nitrate				
	- Large / Medium				
40	**02 Pkt x Safety Gloves**	**China , Local, UK, USA, Korean**			
	General Specifications				
	- Cotton Gloves				
	- Large / Medium				

MACHINES / TOOLS / EQUIPMENTS (MACHINE SHOP)

S. No	Description	Qty	Estimated Unit Price (US$)	Purchase (CIF/Local) pl include 17% in case of local (US$)	Total Price (US$)
1	Multi Functional Lathe, Mill & Drill Machine with complete standard accessories	1			
2	Plate Shearing/Bending/Rolling Machine (3-in-1) with complete standard accessories	1			
3	Bench-top Radial Drill Press with complete standard accessories	1			
4	Manual Utility Hydraulic Bench Press with complete standard accessories	1			
5	Table Saw with complete standard accessories	1			
6	Bench Type Hand Plate Shear/Cutter with complete standard accessories	1			
7	Manual Press with complete standard accessories	1			
8	Bench Tool Grinder with complete standard accessories	1			
9	Impact Drill Machine with complete standard accessories	1			
10	Manual Hand Drill	1			
11	Lathe Accy (as well Multi Functional Lathe)	Set			
12	Lathe Tool Set (HSS) 0.5``x 5`` ~ 0.25``x5``	Set			
13	Lathe Tool Set (Diamond Bit) 0.5``x 5`` ~ 0.25``x5``	Set			
14	End Mill Cutters Set (HSS) 1mm ~ 25mm	Set			
15	End Mill Cutters Set (Diamond Bit) 1mm ~ 25mm	Set			
16	Drill Bit Set 1mm ~ 25mm	Set			
17	Drill Bit Set 3/16`` ~ 1``	Set			
18	Manual Pipe Bender 0.25`` ~ 2``	1			

19	**Portable Disk Grinder**	**1**			
20	**Metal Cut Off Saw**	**1**			
21	**Arc Welding Plant with complete standard accessories**	**1**			
22	**Argon Welding Plant with complete standard accessories**	**1**			
23	**Bench Vices**	**4**			
24	**Wood working Bench Vice**	**2**			
25	**Heat Gun 3000w with complete standard accessories**	**2**			
26	**Hand Riveting Gun with complete standard accessories**	**2**			
27	**Digital Vernier Caliper with complete standard accessories**	**1**			
28	**Digital Micrometer with complete standard accessories**	**1**			
29	**Height Gauge with complete standard accessories**	**1**			
30	**Digital Clamp Meter with iFlex**	**1**			
	3 - 5 years				
31	**63 Pieces Electrical Tool Kit Network Test Maintenance Tools Telecom Kit C9003A**	**Kit**			
32	**14in1 60W 110V Electric Soldering Tools Kit Set Iron Stand DE soldering Pump**	**Kit**			
33	**Professional 301 Piece Mechanic's Tool Kit Set Shop Garage Vehicle Repair Tools**	**Kit**			
34	**10Pc Body Fender Hammer Dolly Repair Service Kit**	**Kit**			
35	**Marking and Measuring Kit**	**Kit**			
36	**75PC SAE/METRIC TAP AND DIE SET**	**Set**			
37	**Safety Glasses Clear & Smoke**	**6**			
38	**Bolle ATOM Safety Goggle and Face Shield Set**	**4**			
39	**Safety Gloves**	**4 Pkt**			
40	**Safety Gloves**	**2 Pkt**			